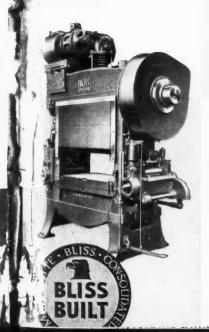
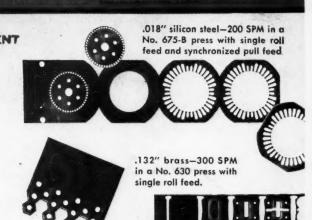
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Increase Output
and Cut Costs
On BLISS
High-Production
Presses





Complex stampings produced with one stroke, one press, one man on Bliss High-Production Presses.

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Write for Catalog No. 27-B

E. W. BLISS COMPANY



\*Trade Mark Reg. U. S. Pat. Office GEORGE

1705 Racine Street, Racine, Wisconsin, U.S.A.



For brief facts about the Gorton line of tracer-controlled machines, use coupon or company letterhead and request Bulletin 1655 illus-trated above. For specific information on cer-tain machines, see text accompanying each illustration.

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loward John M Granvil Margare ichard

†Pats. Applied For

Name.... Address..... State.....

### TECHNOLOGY DEPARTMENT

OLUME 21 NUMBER 12 MAY, 1949

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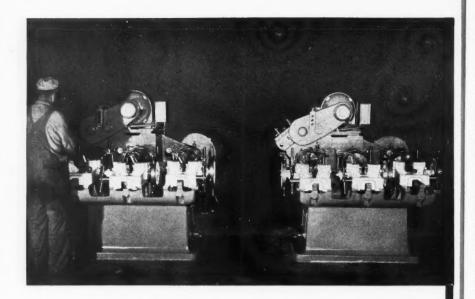
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## Railroad Cuts Standby Maintenance Costs

• Large savings in capital invested in heavy machinery and hourly labor costs have been effected in the maintenance shops of the Chicago, Burlington, and Quincy Railroad. In the past, four machines, each with an operator, were used exclusively for threading 11/4" steam engine bolts.

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For further information and specifications, write for Bulletin B-55.

THREAD

CUTTING, GRINDING, & TAPPING EQUIPMENT

MODERN MACHINE SHOP

May, 1949

The Hea thin

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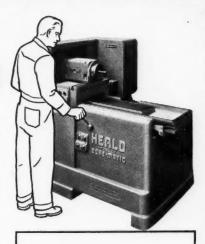
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really think

about the

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"Efficient guarding — convenient control location."

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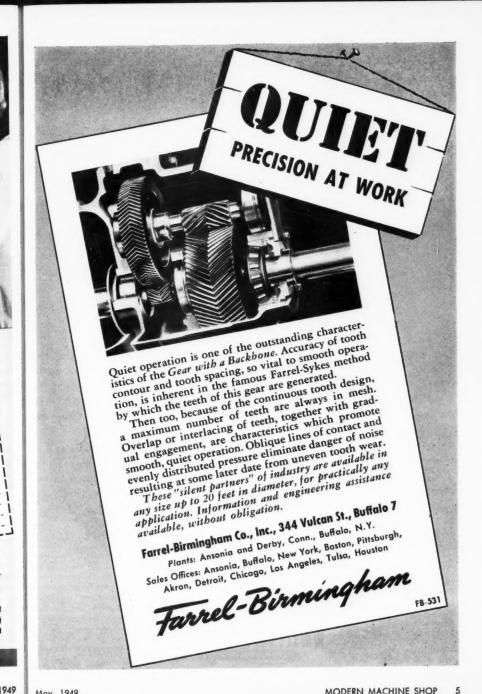
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2HW49

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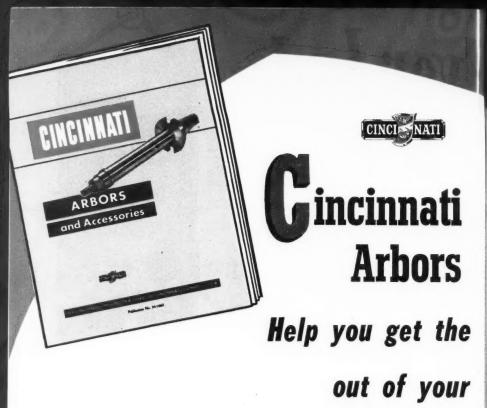
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Madison 10, Wisconsin

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THE CINCINNATI MILLING MACHINE CO.

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3rd Prize: Charles A. Hauck, Callege Point, L. I., N. Y.

4th Prize: John A. Watkins, Royal Oak, Mich.

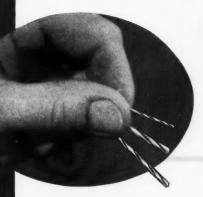
5th Prize: Raymond W. Warman, Louisville, Ky.

6th Prize: Eugene A. Smith, Atlanta, Ga.; Guy Fifield, Rochester, N. Rey A. Freeman, South Gate, Calif.

12

May,

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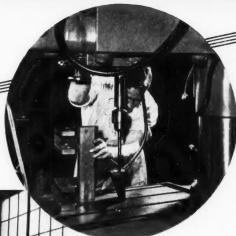
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18



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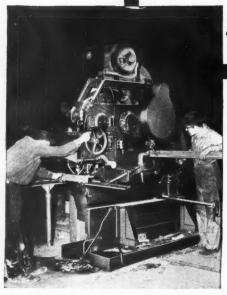
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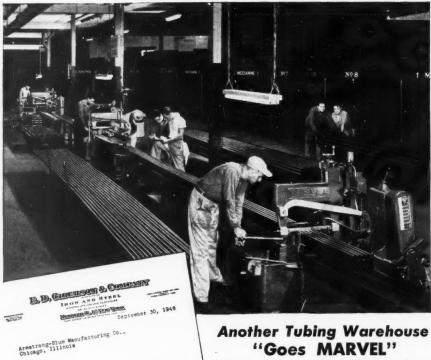


Write for Catalog Section G-105 showing specifications and description of Gerotor Hydraulic Pump Units.

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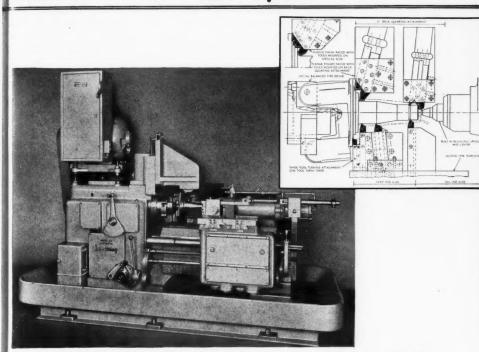
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# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



# MODEL AR AUTOMATIC So-swing LATHE SPEEDS MACHINING OF HEAVY TRUCK STEERING KNUCKLES

Problem: To rough and finish face large flange and turn stem diameters of heavy truck Steering Knuckles in a single operation. Flange faces and diameters must be smooth and accurate. Stem bearings to be turned slightly oversize for grinding operation.

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Solution: The Model AR Automatic Lo-swing Lather selected for this job was equipped with one standard front turning carriage, one standard automatic back squaring attachment and one standard vertical slide. The small line drawing shows the details of the tooling used on all slides. The flange faces and diameters

are first rough turned with tools mounted on the automatic cam-operated back squaring attachment, while the stem is turned to grinding size simultaneously with this operation. The above tools then retract from the work and the flange faces and diameters are finished faced and turned with separate tools mounted on the vertical slide. This method produces a smooth, accurate job in a single operation with only one handling. The dotted line shows the amount of surplus material being removed, which is considerable on the flange end.

Our Engineering Staff will assist you in solving your tough turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

# Here's a sample of work



The following operations are performed on the work piece shown . . . Drill, countersink and tap eight  $\frac{1}{4}$ "-28 tap holes . . . Drill, ream and chamfer both ends of one  $\frac{1}{8}$ " hole . . . counterbore for  $\frac{5}{8}$ " dia. segment . . . drill two  $\frac{3}{4}$ " holes . . . counterbore two  $\frac{5}{8}$ " holes . . . drill, countersink and tap one 8-32 hole . . . drill, countersink and tap two  $\frac{3}{8}$ "-24 holes.

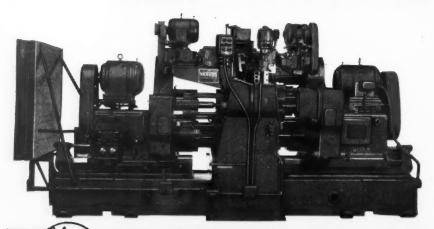
Here is a Morris Mor-Speed Production Machine designed and developed to meet specific job conditions and produce a finished piece at each index of the machine.

This is a two-way horizontal, eight station, automatic indexing machine which drills, reams, countersinks, forms radius and taps refrigeration unit cylinders shown at the right.

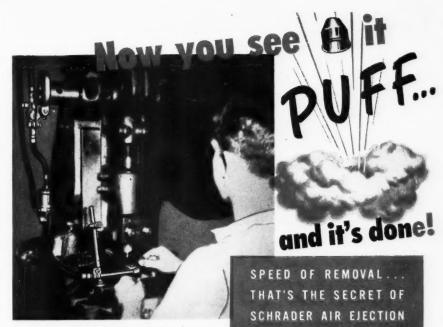
The machine is equipped with nineteen drilling spindles, fourteen countersinking spindles, four counterboring spindles, one reaming spindle and eleven tapping spindles. There are twenty spindles in the left-hand head and 18 in the right-hand head.



## HANDLED BY THIS MORRIS MOR-SPEED PRODUCTION MACHINE







Magic in the way it solves ejection of WORK— ELIMINATES Mechanical Knock-out—No RISKY MANUAL removal of WORK. Magic in the way it conserves your air consumption. Magic in ease of installation.

The Standard Set produces a blast of short duration, timed by an adjustable cam suitable to eject work that is left lying on the die.

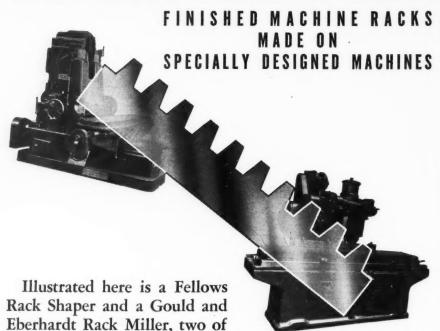
The Pilot Ejection Set enables you to deliver a blast of air timed with automatic shut off for ½ second up to as long as is required to remove the work. With this set you can eject work any time during the entire cycle... or after the part is carried up by the ram, such as in compound dies.

The saving of air is astonishing. Schrader Air Ejection sets are inexpensive; packaged complete, ready-to-install. They pay for themselves within a short time by air savings alone. There's a set for every need. Schrader will solve your ejection problems. Write for information and literature today.

ALWAYS SPECIFY SCHRADER. THE COMPLETE LINE OF AIR CONTROL PRODUCTS

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Schrader	MAIL THIS COUPON TODAY  A. SCHRADER'S SON, 475 Vanderbilt Avenue, Brooklyn 17, N. Y. Division of Scavill Manufacturing Company, Incorporated  Please send me information and free literature about the products I have checked in the circles at the right.	Air Cylinders Opparoling Vehres Press A Sheer Controls Air Ejection Sets Blow Guns Air Line Couplers Air Hose & Rivinge
CONTROL THE AIR	COMPANY ADDRESS CITY ZONE STATE AMS	Hose Roots Hydraulic Gauges Pressure Regulators & Ottom Air Stratuers Linear Turn Time

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the many specially designed machines on which our expert mechanics cut accurate and finished racks. This accuracy and finish cannot be matched by any other company.

We can furnish rack from almost any sized blank in almost any pitch and of almost any length in a continuous section.

Write for catalog which illustrates the pitches we are prepared to cut.

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PLANTS: BEAVER FALLS, PENNSYLVANIA

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## Center Drills by Reltool

With the enlarged and modern facilities afforded by its new manufacturing plant . . . Reltool is in an advantageous position to supply SPECIAL CENTER DRILLS to meet your most exacting requirements. When regular Reltool Center Drills . . . Standard or "Shockless" . . . won't fill the bill . . . remember that Reltool can furnish "SPECIALS" promptly, at reasonable cost. Mail sketch and specifications or sample of work-piece for estimate.

### The Standard RELTOOL Line Includes: -

Center Drills • End Mills • Key Seat Cutters • Lathe Mandrels • Milling Cutters — all types • Metal Slitting Saws • Tool Bits • Counterbores • Form Tools • Reamers • Taps. If you don't have the latest Reltool Catalog, write for it today.

We are seeking additional Sales Representation

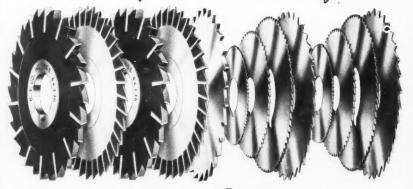


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# Certified Quality



**Unquestioned Accuracy** 

CIRCLE (R)



METAL CUTTING TOOLS

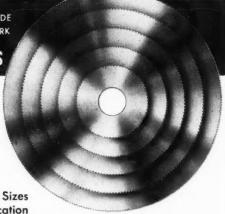
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# Take high cost labor off obsolete machines

PRODUCE MORE WITH THE NEW

JIBLEY 20

MODEL C-20 20" DRILLING MACHINE

10 YEARS AGO LABOR COSTS WERE 1/2
OF TODAY'S — ARE YOUR MACHINISTS NOW
USING THE SAME DRILLING MACHINES?

Install a new model C-20 in your plant and make a comparison with production obtained from your present drilling equipment. It will demonstrate the advantages of such features as easy access to controls — where you turn a knob to select the proper geared power feed; convenient shifting of V-belt; power to drill 1½" in mild steel; 8 spindle speeds ranging from 65 to 1360 R.P.M. powered by a 2 H.P. motor.

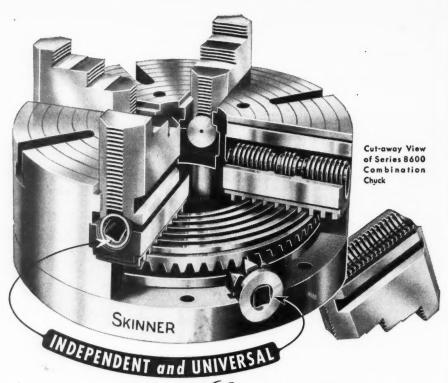
Model C-20 Sibley 20" swing drilling machine complete as illustrated with 2 H.P., 3 Phase, 60 Cycle, A.C. motor and magnetic type starting switch.



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## ...it's a Skinner Combination Chuck

### The fast, accurate way to chuck parts of irregular shape

Combining the flexibility of an independent chuck with the fast gripping and releasing action of a Universal chuck, a Skinner Combination Chuck simplifies and speeds the mass production of irregularly shaped precision parts. Actually two chucks in one, a Skinner Combination Chuck allows independent and accurate positioning of each jaw to suit odd-shaped pieces. When set to hold the work precisely, the wrench may be applied to any pinion to move the jaws in unison as in a self-centering Universal Chuck, thus cutting repetitive chucking time to a minimum.

Skinner Combination Chucks are precision-made tools of exceptionally rugged construction. The well-proportioned bodies have jaw slots carefully machined to close limits with heavy ribs to securely guide the jaws in their proper plane. All working parts are made of suitable alloy steel properly heat treated for their particular function.

The Series 8600 Chuck shown above is but one of a complete line of three and four jaw Combination Chucks manufactured by Skinner. It will pay you to get full details on Skinner Combination Chucks if you are interested in a faster, more accurate way to chuck duplicate parts of irregular shape.

Complete information on Skinner Combination Chucks as well as on all other Skinner chucking and vise equipment is contained in Catalog No. 61. Write for your free copy today.

The Skinner Chuck Co.

Skinner Chucks

HAND & POWER OPERATED MACHINE CHUCKS—AIR CHUCK EQUIPMENT—FACE PLATE JAWS—MACHINE VISES



makes perfect drill points on the

OLIVER 510 DRILL POINTER



The eccentric action of the abrasive wheel on the Oliver "510" Drill Pointer generates correct point clearances, produces the only theoretically correct point for twist drills. Hundreds of tests by hundreds of users prove that Oliver sharpened drills are more uniform—last longer between grinds—and therefore save valuable dollars invested in time and tools.

The Oliver "510" is a machine that will pay for itself in your toolroom. Its automatic features eliminate troublesome variations in sharpening—you need no longer depend on the personal skill of one trained tool grinder—mechanize with Oliver and save all the way.

Want proof? Send us a few of your drills to sharpen, at no obligation to you. Try them on your own job—we know the correct Oliver point will prove itself to you.





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Adrian, Mich.

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS — DRILL
POINT THINNERS — TEMPLATE
TOOL GRINDERS — FACE MILL
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## ALLEN TRU-ROUND DRYSEAL PIPE PLUGS

100% Pressur - Formd FULL STRENGTH
SOCKET WON'T
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This newest Allen O Head product, made of Allenoy steel, meets all the demands of a dryseal plug in applications involving extreme pressure, such as in refrigeration and hydraulic equipment. For use with dryseal taps. No sealing compound required.

It stands up under repeated wrenching as no plug has before. Its Pressur-Formd socket, unweakened by drilling and broaching, is so strong the key will shear before the socket strips.

Pressur-Formd threading insures metalto-metal contact all the way by producing burnished threads. This method prevents distortion and nicked, imperfect threads which gouge softer metals and impair the seal. Accurate fit is assured by  $360^{\circ}$  roundness, and by a perfect taper, at both the pitch and crest diameters.

Here's positive protection against the high cost of leaky or faulty pipe plugs. Get "Tru-Round" Dryseal Pipe Plugs by ordering genuine Allens in the distinctive black and silver box.

Now available in sizes from 1/6" to 1/4". No increase in price. Write us for samples and engineering data.



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Our "Tru-Round" standard pipe plug, also Pressur-Formd, is leakproof, and a sealing compound is not ordinarily needed for pressure-tight joints.

Precise roundness and smoother threads make for better seal. Threaded strictly in accordance with Army-Navy Aeronautical Specification AN-P-363. Fully guaranteed.



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For ease and speed in set-ups and job-changes, Greenlee's universal tooling is the answer. Interchangeable tool holders fit any cross slide cavity...can be changed quickly... and insure precision and uni-formity in the production of duplicate parts. These outstanding GREENLEE features can greatly improve the efficiency of your production.



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# SNOW! MACHINES

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Tomorrow's profits must come from lower costs. "Push Button" machine tools are imperative in today's competition. Snow Drilling, Tapping and Threading Machines are establishing amazing records daily. For faster production at lower cost Snow Machines are unsurpassed-versatile-economical.

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5NOW DRILLING MACHINE— Extremely sensitive pressure control allows drill to establish proper feed—cuts drilling time lengthens tool life.

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— Produces accurate threads
true to lead and thread form.
Standard master fixtures
minimize handling time.



HIGH PRODUCTION DRILLING, TAPPING, THREADING, NUT TAPPING, 2 SPINDLE, PRIZZONTAL MACHINES, DRILL PRESS TAP HEADS, JIGS AND FIXTURES

SNOW TAPPING MACHINE — Typical of advanced design and performance is the Snow Full Universal Tapping Machine. Electrical controls allow selection of operation method. Extreme sensitivity to power application prevents tap breakage. Class 3 and 4 fits and production up to 5000 parts per hour are possible. 4 sizes cover range from 40 to 34° in mild steel.

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### The Monthly Robertson Bulletin

### TOOL SALVAGE

PRODUCTION COSTS are in everyone's mind these days. Tool costs, of course, have a very important bearing on production costs, and reconditioning tools can be a big factor in your drive for economy.

Reconditioning tools is not at all difficult, provided you have the right wheel. The ideal wheel is a Robertson "Cool-Cut." Because of the open structure of this wheel, the grains remove the metal rapidly . . . yet you obtain a finish equal to that produced by a close-grained, conventional wheel.

Here is one example of the sort of work a "Robertson" does on a tough reconditioning job. A 6'' x 34'' high-speed milling cutter was re-cut in 15 minutes. A regular conventional wheel required 40 minutes to do the same job.

Another interesting reconditioning operation involves surface grinding steel-and-carbide reamer blades, inserted-tooth milling cutters and other carbide-tipped tools. The carbide tip and the steel can be ground in the same operation with the same Robertson Wheel without glazing the wheel or generating excessive heat. The depth of the cut varies according to the size of the piece, but

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small reamer blades, for instance, can be successfully ground with .002" down feed and .015" cross feed. Robertson Wheels for this operation range from 7" x 1/2" to 12" x 1" in size.

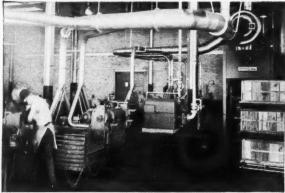
For the best results from any grinding operation, make sure your grinding wheels are "Robertsons"... the wheels that are precision-built for the toughest jobs. Write for your free copy of the interesting pocket booklet "How to Buy Production Time."

## ROBERTSON MANUFACTURING COMPANY TRENTON 5, NEW JERSEY

Resin-Bonded and Vitrified-Bonded Grinding Wheels • Mounted Wheels • Segments



## ROTO-CLONE



Battery of stand grinders used for foundry snagging operations is served by two Type D Roto-Clones.

## gives dust a one-way ticket

DUST can't linger here to cloud the atmosphere, foul up equipment and irritate workers. The moment it is generated, it's on its way out via Roto-Clone\*.

This battery of stand grinders used for snagging castings is served by two Type D Roto-Clones installed back to back. Note the compactness of the installation. Location of the Roto-Clones at dust source eliminates long, costly pipe runs.

Constant efficiency, uniform air volume, small space requirement, low cost and ease of installation—these are the features of the Type D Roto-Clones that have made this unit a leader in the industry's winning battle over dust.

A Type D Roto-Clone Dust Control

System may be installed as a central type with main duct and branch connections (as pictured), or as an individual unit serving a single dust-producing operation. For complete information, call your local AAF representative or write direct to address below.

IT'S A FACT! More grinders are exhausted by the Type D Roto-Clone than any other type of dust collector. Bulletin No. 272A tells the story. Write for it now!

\*Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.

#### AMERICAN AIR FILTER COMPANY, INC.

100 Central Avenue . Louisville 8, Ky.

In Canada: Darling Bros. Ltd., Montreal, P. Q.



ROTO-CLONE®

DUST CONTROL EQUIPMENT

POTO-CLONE



For complete details, applications and accessories, write for NEW circular No. 1025

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AURORA, ILLINOIS
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PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the protection and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

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This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screw threads and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

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for the exact measurement of multiple worms and screws of unknown profile. The Fundamental Fact

The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.



Set No. 20 Thread Measuring Wire is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

Price, High Speed Steel Wires .. \$ 95.00
Price, Carbolov Wires ....... 240.00
Special wires from .002" to 2.000" diameter are made

to any tolerance required.

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THE demand throughout industry for a flatter, smoother, more wearresistant surface plate prompted Norton Company to develop the first ceramic surface plate to be marketed. Made by specialists in wearresistant materials and precision surface finishes, the Norton Ceramic Surface Plate has six important qualities

1. longer life
2. flatter surface

3. smoother surface

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Made of one of the hardest materials known, these plates show to the best advantage in severe production gaging and blueing operations. The precise flatness combined with the unusual smoothness of this ceramic surface plate shortens the time required to take readings on an indicator; and it prevents wear of expensive gage blocks, instrument bases and sine bars.

The Norton Ceramic Surface Plate is guaranteed to be flat within .0001", and it stays flat. It will not warp or deform, will not sweat or corrode, will not deflect under load, will not give expansion troubles. It is non-magnetic

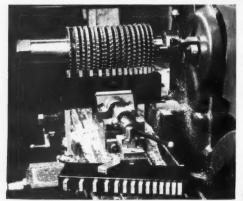
For more information on the longest-wearing, precision surface plates ever made—write: Norton Company, Worcester 6, Mass., for our free Bulletin No. 1174.



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## THEY SAID IT COULDN'T BE DONE!



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WITH AN LLING MACH

How to save time and labor in machining 1,000 printer's type gauges was a problem that confronted F. W. Kolkman, owner of the Plastronics Co., San Francisco. Distances between the gauge blocks, made of hard alloy aluminum, had to be held within - .001", - 000".

Kolkman decided to set up a gang of cutters and do the entire cutting job on one side in a single operation — a total of 22 cuts! He was advised it couldn't be done. When the arbor nut was tightened, he was told, spring in the specially ground spacers and cutters would make accuracy impossible.

But Kolkman, using extreme care, and his Atlas Milling Machine did it, with no trouble whatsoever in keeping within the tolerances. The Atlas 11/2" dia. overarm of stress-proof steel, the rigid arbor supports, and the heavy base and table provide the ruggedness required for the gang cut - and Atlas power, precision controls, and operating accuracy do the rest.

Ask your Atlas distributor to show you how a low-cost Atlas Milling Machine can save time, work, and money in your shop, too. Write for catalog.



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Use the MOTCH & MERRYWEATHER TRIPLE-CHIP METHOD GOOD START SAVING IMMEDIATELY!

Triple-Chip
Method cut of
1728 pieces before blade needed resharpening.
Total tool cost per
cut at free, exclusive
of labor and overhead,
including pro-rated
original cast of resharpening—
\$.0029. Total
tool cost for
100.000 pieces

-\$290.00.

Triple-Chip vs. Alternate Method (SAWING SAE 1020, 3%" O. D.)



Alternate method cut off 260 pieces for cost of blade. Blade "done for"; no restarpening possible. Total tool cost per cut off piece, exclusive of labor and overhead—\$.0174. Total tool cost per 100,000 pieces—\$1740.00.

Faster feeds and speeds are one answer to increasing production and decreasing costs. Lower to costs are equally important. Use of the Triple-Chil Method insures that the cut off ends shall be

square, clean with milled finish and accurate to length, eliminating facing or squaring operations. It addition, the narrow kerf of the Triple-Chip blade reduces stood waste to a minimum. Take advantage of the Motch & Merryweathe Triple-Chip Method. It increase production . . . lowers tool costs . . saves time and material.

Write us for complete information

he Model O-A, ith capacity to 4" and or square, is ne of a complete inge of circular

twing machines for stock from "4" 16"4" diameter. Standard or high seed models of all sizes are available r sawing either ferrous or non-fersus metals.

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO



• Immediately a "ROCKWELL" or "TUKON" Hardness Tester is put into use, its purchase price becomes its least important feature. From then on the only measure of value is the accuracy of every test made.

The dependable, enduring accuracy of all Wilson hardness testing equipment is assured by Wilson's long experience, the Wilson Standardizing Laboratory and Wilson Field Service Engineers. In terms of hardness testing service, Wilson offers you most for every dollar you invest.

Write for catalog RT-46 on the "ROCKWELL" Hardness Tester and Bulletin DH-7 on microhardness testing with the "TUKON" Tester.



BRALE is the only diamond indenter made to Wilson's precision standards for use on "ROCKWELL" Hardness Testers and "ROCKWELL" Superficial Hardness Testers.

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MECHANICAL INSTRUMENT CO., INC.
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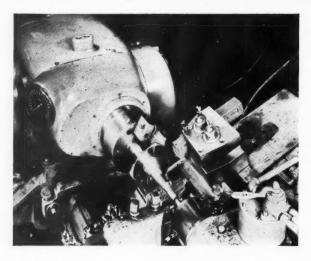
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### SAVE WITH SINGLE-POINT TOOLING



Air-gage trace it on the MONARCH MONA-MATIC



You can turn it faster, cheaper, more accurately -on an Air-Gage Tracer-equipped Mona-Matic.

Here's a typical example: forged steering knuckles finish-machined in 1.23 minutes-in one setup. Full advantage is taken of two optional plus features: the two-speed main drive motor permits shifting to half speed at any desired point in the cycle—to maintain finish as the tool moves out along the flange. The rear tool slide is timed to lead the front tool slide, performing a roughing cut on the flange to prolong the life of the front tool.

The second plus feature is the automatic feed change-providing up to five infinitely variable feeds, as required. This flexibility of operation allows maximum machining efficiency in the removal of variable stock, so characteristic of forgings.

The Mona-Matic method is adaptable to a vast variety of workpieces; it has made spectacular savings on many a production line. May we show you how it can help lower your own costs?

#### JOB FACTS

Part-Steering Knuckle Material—SAE 3135 forging Operations Performed—Turn stem complete; face flange Cutting Tool-Carbide Insert Tolerance-± .001" Total Machining Time-1.23

Note -Two pieces are produced in the above time, as one man operates two machines.



A GOOD TURN FASTER - TURN TO MONARCH

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

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# COST CUTTERS . . . because they have the ADJUSTOMATIC® clutch

If you have the problem of getting smoother, faster, more uniform production screw driving . . . then Millers Falls portable electric screw drivers will pay off for you in results and savings.

Their patented, super-sensitive "Adjustomatic" clutch is the reason. It gives velvet smooth, vibrationless operation even on assemblies usually considered too delicate for a power driver. So sensitive it delivers the *right* torque for screws from No. 10 down to No. 2. Lengthens the useful life of the tool. Increases assembly and production efficiency and speed, cuts costs.

Write for full information and the name of your nearest Millers Falls distributor. He can help you. Millers Falls Company, Greenfield, Mass.





## Finish Larger Areas



"burnouts" due to overloads. Swiveling motor mounting permits flexible shaft to follow operator's movement on sanding, grinding or wire brushing. Working tool operates at any angle, in any position. • 3/4 to 3 H.P. Direct Drive, Geared Head and Countershaft models with caster base or overhead trolley mounting.

Write Flexible Shaft Division for FREE Booklet
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Chicago 19, Illinois

Bench Leader demonstrates new Lufkin

"CHROME CLAD" Micrometer

with Non-Glare Satin Finish

E. J. Samel, veteran of the Packard Motor Car Company tool room, approves its easy-reading, rust and wear resistant features.

● Its satin finish absorbs light, prevents glare and eyestrain. Markings stand out sharp in any light. It is rust and wear resistant. Hardened ground thread, one-piece spindle, ease of adjustment and "rapid reading" (each thousandth numbered) are a few of the many desirable features of this great improved tool. Here's a real ally for the precision worker to whom accuracy is a must.





Designed to make accurate measurements easy for the operator. Heavy chrome plating with non-glare satin finish brings out markings sharply without eyestrain. You get readings at a glance in bright or poor light.



"See how throat depth and cutaway frame make entry possible in minimum clearance and enable easy measuring to maximum depth in narrow slots."



"It is well-balanced. Ratchet stop eliminates overpressure, gives more consistently accurate measurements —important when your 'feel' is off."



"Look—you can take it apart completely, even clean inside of thimble and thread. And the reading line keeps its original position permanently—directly in line of vision after adjusting for wear or lapping of anvil and spindle faces."

#### Seven Superior Features

"Chrome Clad", Non-Glare Satin Finish

Hardened Ground Thread

**One-Piece Spindle** 

Micro-Lap, Mirror-Like Finish on Anvil and Spindle Ends

**Cutaway Frame** 

Easy Adjustment

"Rapid Reading"

No. 1 IN A SERIES OF MESSAGES ON PRECISION IN INDUSTRY

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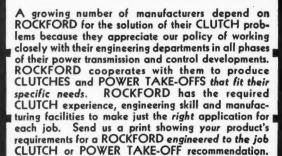






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Installation











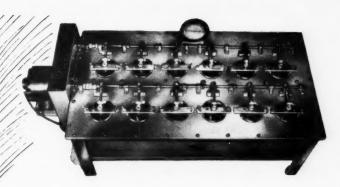




ROCKFORD CLUTCH DIVISION

300 Catherine Street, Rockford, Illinois





#### This stainless kettle makes a fine brew

Before your favorite lager is brewed, the malt is analyzed to determine quality and yield per ton. Heart of the testing equipment is this stainless "kettle"—a combined water heater—circulator that keeps the mash bath at required temperature. While gently stirring the samples for uniform suspension, this ingenious device automatically provides a temperature of 45°C... increases it 1° per minute up to 70°C and holds this maximum for an hour... cools to 25°C—then shuts itself off.

Stainless steel is used throughout, since even the slightest contamination makes a test worthless. Water is heated electrically, by elements encased in stainless tubing. The cups are spun stainless sheet, the top is stainless plate, and the agitator assembly is stainless bar. The machine also requires stainless strip, pipe, valves and pipe fittings—even the legs are stainless angles. Yet every bit of stainless used in this machine is obtained—overnight—from a nearby Frasse warehouse.

It's simpler, when you're working with stainless steels, to work from Frasse warehouse stocks. The wide range of forms and analyses, so quickly available from this nearby source, is a time and effort saving convenience. For stainless, call Frasse. Peter A. Frasse and Co. Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200) • 3911 Wisshickon Avenue, Philadelphia 29, Pa. (Baldwin 9-9900) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) • Jersey City • Syracuse • Hartford • Rochester • Baltimore.

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### for Stainless Steels and Tubing

BARS • SHEETS • STRIP • PLATES • TUBING • ANGLES
PIPE, VALVES AND FITTINGS • ELECTRODES

Mechanical Properties for Various Forms and Tempers

This new Frasse data chart A-7 supplements the usual stainless property data with a wealth of additional detail. It shows typical properties-tensile, yield, hardness, etc.—of bars, strip, sheets, plates and wire in various tages of cold working a best to

succes, places and water in our loads stages of cold working or heat treating. Invaluable for careful selection of best stainless steel for your application. Send for a free copy today.

Peter A. Frasse and Co., Inc.
17 Grand Street, New York 13, N.Y.

Please send me a free copy of your new stainless steel mechanical properties data chart Sec. A, No. 7.

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Addren

Schwarz Automatic Malt Mash Bath by Schwarz Labotatorics, Inc. Fabrication: Metropolitan Tool Works

171

## PRODUCTION MARKING

helps you to lower today's high operating costs . . .

Whatever you make Noblewest can mark permanently—faster—better—at lower cost. Typical is Noblewest Model 275 vertical dial Rapid Precision Marking Machine. Shown tooled for marking and grooving telephone wire splicing tubes, it does these two jobs in one operation at the rate of 125 pieces per minute. Simple gravity feed and unloading are both automatic and foolproof. The in-

scription is permanently rolled in—lasts as long as the product itself. Send for copy of our latest catalog "Modern Metal Marking Methods," or better still, let our engineers make recommendations for your specific requirements. Write Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn.



Send for copy of our latest catalog" Modern Metal Marking Methods," or better still, send us complete details of your specific requirements.

MARK IT
BEST WITH

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IMPROVED
OSVICES

EQUIPMENT FOR MARKING - GRADUATING - EMBOSSING - NUMBERING

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## How close can you machine a dollar

With labor and material costs at their present levels, it takes some mighty careful management to hold your *unit costs* to the tolerances required for competitive selling.

One good way to do this is to install new and more efficient machine tools . . . such as the completely redesigned ROCKFORD 14" Geared-Head Economy Lathe. It is fast and easy to operate and is ruggedly built for long service. Though medium in price, it provides accurate work . . . for the tool room, maintenance shop, or production line.

We'll be glad to send you full particulars. Write for Bulletin 462.

#### ROCKFORD MACHINE TOOL CO.

ROCKFORD • ILLINOIS

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ALSO DESIGNERS AND BUILDERS OF ROCKFORD







1.P Ring Gages with Norbide® insert are available in sizes from .240" up

T-P Cylindrical Plug Gag

## GROUND LAPPED

T.P Cylindrical Plug Gage with tungsten carbide gaging surface

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TAFT-PEIRCE CYLINDRICAL PLUG AND RING GAGES

T-P Emmerton Ball Bearing Filot Plug Gage

7-P External Ring Gage with insert gaging surface of tungsten carbide \*Norbide (Boron Carbide), Trademark of Norton Co., Reg. U. S. Pat. Off.

T-P Style 9324 AGD Flange-type External Ring Gage of hardened allay

You'll find that more pieces can be gaged per gage dollar when you standardize on Taft-Peirce

Cylindrical Plug and Ring Gages. Not only are they made of the finest materials, heat-treated for maximum hardness, but they are ground and lapped to gagemakers' limits of accuracy by a special process which produces a super-smooth surface, assuring long wear-life and dependable precision.

The exceptionally complete Taft-Peirce Gage line includes Emmerton Ball Bearing Plug Gages, special gages to your specifications, and of course all American Gage Design standards. Available in alloy steel, Norbide,\* Tungsten Carbide and Chromium plated. Write to:

THE TAFT-PEIRCE MFG. CO.

WOONSOCKET, RHODE ISLAND
T-P MEANS TOP PRECISION

AN GEO

NATION-WIDE ASSEMBLY SERVICE

HIGHLY CONTROLLED ACCURACY

COMPLETE INTERCHANGEABILITY

... when you specify

## DANLY Precision Die Sets

Nation-wide die set assembly service, pioneered and perfected by Danly, is today a highly specialized business offering the stamping industry a fast, efficient means of obtaining deliveries on short notices. Because there are several Danly types and several thousand interchangeable combinations, a simple catalog selection is all that is usually required to suit specific needs.

The highly controlled accuracy of Danly Die Sets, with guide posts and bushings ground and lapped to close precision tolerances, assures top performance and long die life.

In addition, because designs and tolerances are standardized and maintained, you are assured of complete interchangeability. This is why so many plants have found it profitable to standardize on Danly Die Sets gaining flexibility of operation and worthwhile economy.

> Use Danly's Special Machining Service and Save Time . . .



For special die sets, include any additional machining on your special die set order. Die wells, inserts, keyways and other operations will be performed to your specification.

Write for free bulletin and complete details



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- Detroit 16, 1549 Temple Ave.
- \* Grand Rapids, 113 Michigan St., N.W.
- \* Long Island City 1, 47-28 37th St.
- Los Angeles 54, Ducommun Metals & Supply Co., 4890 S. Alameda
  - Milwaukee 2, 111 E. Wisconsin Ave.
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DANLY

DANLY MACHINE SPECIALTIES, INC.





25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

### GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give a shearing cut that eliminates all chatter. Made of high speed steel ground after hardening.

12 sizes: 1/4, 3/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 11/4, 11/2, 13/4, and 2 inch.

Standard 30°, 41°, 45° with center line. Also made in any other angles to order.

SEND FOR CATALOG SHEET No. BC1



Grobet
SINCE 1812

SET CL ELEVEN COUNTERSINKS IN STRONG WOODEN CASE 1/4" to 1 1/2"

GROBET FILE CO. of AMERICA Inc.

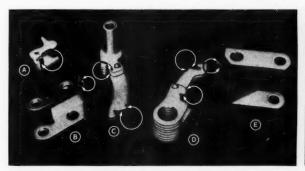
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PLANTS: NEW YORK . CHICAGO

SOLD THROUGH LEADING SUPPLY HOUSES.

## How to take the guesswork out of contour-grinding

Moore Panto-Crush Wheel Dressers Step Up Latch Output 30% for I-T-E, Assure Interchangeability of Parts.





Five principal I-T-E circuit breaker parts finish ground with Moore Panto-Crush Wheel Dresser. Surface areas between arrows are ground. A comparison of pieces per hour between new method and old method follows:

Part	Moore Panto-Crush	Old Method	Saving
٨	22	15	33%
В	32	22	31%
C	31	18	42%
D	14	12.5	10%
E	25	17	32%

Contour grinding of latch level—Part "E" at left. Here two surfaces and two radii, including inside fillet, are being ground simultaneously.

I-T-E's experience with Panto-Crush Wheel Dressers was fully reported in "American Machinist." We'll gladly send you a reprint and our catalog.

They've taken the "by-guess-and-by-gosh" out of the contour-grinding of toggle latches at 1-T-E Circuit Breaker Company, Philadelphia, switchgear manufacturers. Moore Panto-Crush Wheel Dressers have solved the problem of accurate, interchangeable production of these moving mechanical parts so essential to faultless circuit breaker operation.

Irregular contours are now ground by wheels diamond-dressed to exact dimensions within .0002". Before installing Moores, I-T-E ground the contours by shifting the parts at different angles. Accuracy and field interchangeability suffered. Today both are completely satisfactory, and output itself is up 30%!

The Panto-Crush is mounted on the wheel spindle of a surface grinder. It is the only wheel dresser combining a precision-built pantograph for guiding the diamond from a template and a self-driven crush former. You switch from one to the other without removing workpiece.

MOORE SPECIAL TOOL COMPANY, INC. 730 UNION AVENUE, BRIDGEPORT 7, CONN.



Moore Panto-Crush Wheel Dresser

### ADD (TALLS) TO YOUR TOOLROOM

JIG BORERS . JIG GRINDERS . PANTO-CRUSH WHEEL DRESSERS . DIE FLEPPERS . COMPLETE LINE OF HOLE LOCATION ACCESSORIES

## This 12,500% increase



But True!... In crush form grinding a modified butress thread form on the new Thompson Truform Grinder it was possible to increase production 12,500% without disturbing the set-up!

The secret of this achievement lies in the fact that Thompson Truforming involves a machine engineered and built as a single unit and uses two crushing rolls . . . a "work roll" and a "reference roll." Whenever the "work roll" loses form, the original degree of accuracy is quickly transferred from the "reference roll" back into the grinding wheel and then reground into the "work roll" . . . all without disturbing the set-up.

In this way the "work roll" can be re-processed whenever it loses form and can be used for hundreds of additional dressings, or until it is worn out. In the example mentioned above, it was possible to get over 15,625 additional dressings from the "work roll". This means an increase in continuous production of 12,500%.

So many people have asked about the details of this new Thompson process that a special 8-page leaflet has been prepared with diagrams and answers to questions about Truforming. Just write for—"Tell me about this process," Address Dept. 13.

THE THOMPSON GRINDER COMPANY SPRINGFIELD, OHIO

WRITE FOR NEW THOMPSON CATALOG





20" Sebastian Lathe with 10' bed, roughing out teeth for involute spline broach at Conant Tool & Engineering Co., Chicago, Illinois.

Conant Tool & Engineering Company is decidedly enthusiastic about its recently installed "Kingmade" Sebastian Lathe. Mr. E. D. Conant, President, writes: "We have been roughing out large round broaches made of 18-4-1 high speed steel . . . adaptor plates and broach horns up to 16" diameter . . . doing a considerable amount of thread cutting, and find the machine very satisfactory in every re-

spect... We have realized about a 25% saving in time and we would have no hesitancy about purchasing additional Sebastian Lathes." You will buy performance like this when you specify the modern precision engineered Sebastian—outstanding leader in the mediumprice lathe field. Write now for illustrated Catalog S-1 (Standard Lathes) and S-101 (Special Type Lathes—Gap, Clutch & Brake, etc.)

#### Arastean Sheet Feandthe

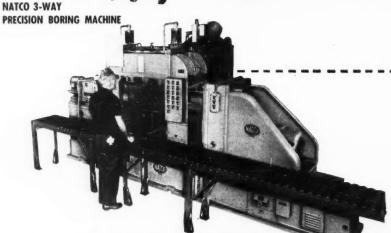
#### KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lather

## How NATCO Machines Speed Automatic Production.....





NATIONAL AUTOMATIC TOOL COMPANY, Inc. Richmond, Indiana, U. S. A.

Branch Offices: 1809 Engineering Bidg., Chicage 409 New Center Bidg., Detroit 1807 Elmwood Ave., Buffalo 2902 Commerce Bidg., New York City

## ... from rough to precision finishing cam and crank holes FOR A PROMINENT MOTOR CAR COMPANY

PART-Cylinder block.

PRODUCTION-66 parts per hour.

OPERATIONS-Core drill four crank bearings from rough to 2.6306. Core drill four cam bearing from rough to 2.4375-2.0625 -2.0312-1.5625. Counterbore outer wall of cam bearing 1,8125 x .2344, Chamfer front side of four cam bearings 1/16" x 45°. Chamfer both sides of rear center crank bearings 3/32" x 45°. Comb. rough bore four crank bearings to 2.6718. Comb.

rough bore four cam bearings to 2.4848-2.1098-2.0778-1.6078. Comb. semi-finish bore four cam bearings to 2.6875. Comb. semi-finish bore four cam bearings to 2.5047-2.1297-2.0977-1,6277.

MACHINE-NATCO HOLEWAY Processing Machine completes all the above operations at one time, clamping, locating and processing from one operation to another automatically.

PART-Cylinder block.

PRODUCTION-45 parts per hour.

OPERATIONS-Precision finish bore four crank bearings to 2.691. Precision finish bore four cam bearings (in babbit) to 2.3751-1.9971-1.9651-1.4971. Finish

counterbore two holes to .6202. Precision finish bore oil pump and distributor shaft holes to 1.0634" and 1.7499".

MACHINE-NATCO 3-Way Machine for the final precision operations on cam, crank oil passage and distributor holes.

IMPORTANT READING-NATCO invites you to read a new series of case histories. By taking you behind the scenes and getting down to hard facts, NATCO Field Engineers show you step by step how they make vital production savings possible through the application of small light sensitive NATCO Machines as well as

NATCO Automatic Processing Machines. Whether or not you are now receiving NATCO mailings regularly, be sure to send in your request for "Success Stories from the Brief Case of NATCO Field Engineers." Write today . . , request: Suc-

Call a Natco Field Engineer NATCO DRILLING, BORING TAPPING and FACING MACHINES

DRILL 2 TO 8 HOLES
... at one Stroke!

MODEL

ADJUSTABLE TO ANY HOLE PATTERN

There's Only One

## MULTI-DRILL for Production Drilling

#### WILL FIT ANY DRILL PRESS

You don't buy a drill head every day. When you do . . . select the head that has set standards of performance, strength and dependability—choose the drill head that has led the way. MULTI-DRILLS have always delivered topmost efficiency and

economy. You can depend on them to pay big dividends on your investment. Get a MULTI-DRILL and be **sure** you're getting the best.

There is a Commander MULTI-DRILL Distributor in your area. Write for his name, literature and complete details.



COMMANDER MFG. CO.

Chicago 24. II

Product of Commander - Builder of the Commander Tapper

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SINCE 1909

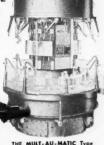
1909 • 1949

of UNIVERSAL BORING
DRILLING and MILLING precision
carried on by ...

## Bullards

70 Years of ENGINEERING EXPERIENCE

Extensive Machine Tool Experience with modern manufacturing facilities turns its hand to the field of Horizontal Boring. Bullard-Universal Boring Machine.



THE MULT-AU-MATIC Type "D" 8-12-16-inch with 6 or 8 spindles. Type "K" 8" with 6-8-12 or 16 spindles.

BULLARD-UNIVERSAL BORING MACHINE 3"-4" or 5" Spindles with several varying bed lengths and post heights.



THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



Two Hevi Duty Vertical Retort Furnaces are used at Western Automatic Machine Screw Company to carburize exceptionally dense loads of screw machine products such as rollers, bolts and pins. Consistent uniform results on these dense loads are assured by multiple zone control of heating elements and rapid circulation of the carburizing atmosphere.

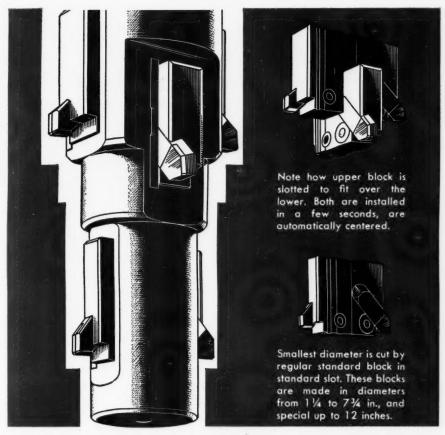
This all purpose furnace may also be used for Nitriding, Dry Cyaniding, Bright Annealing and Clean Hardening. Its rugged construction and easy accessibility of moving parts result in a very economical maintenance cost.

Send for complete details on this all purpose furnace — Ask for Bulletin HD-646.

DRY TYPE TRANSFORMERS - CONSTANT CURRENT REGULATORS MILWAUKEE 1, WISCONSIN

HEVI DUTY

CARBURIZERS



## **Gairing Boring Tools Boost Production**

Quick-Change Blocks Save Man-Hours and Down-Time

Held in the boring bar without locating holes and screws, only Gairing Standard Boring Blocks can be used in such applications as shown above.

The operation consists of boring diameters of 2.693, 2.228, and 1.875 inches in a tractor drive housing, cutting cast iron at a surface speed of 200 F.P.M., 0.020" feed per revolution. Here, as always, blocks are pre-set to size, perfectly self-centered; always positively locked, rigidly driven. They are used extensively for rough boring as well as for semi-finishing and reaming operations.

Let us show you how GAIRING BORING BLOCKS may be applied to your problems.

The GAIRING TOOL COMPANY, Box 478, Detroit 32, Mich.



Write today for the Gairing Block-Type Boring Tool Catalog

### This better way of Contour Finishing





Long belts for cooler cutting. This set-up was devised by Behr-Manning Application Engineers.

Grinding an inside curve is easy with a contact wheel formed to do it.

The concave surface on this contact wheel fits the job perfectly.



# ... another case of BEHR-MANNING PIONEERING with METALITE® BELTS

A flexible abrasive belt and a contact wheel formed to fit the work — this was the successful answer by Behr-Manning engineers to the growing demand for higher production, better finish, and greater economies in a wide variety of contour grinding jobs.

The wrench finishing method illustrated is a case in point. Faster, because of the sharper, factory-coated belt. Better finish, because of the grit uniformity of the METALITE belt, and the uniform pressure of the formed contact wheel. Greater economies because operators produce more pieces per hour — and because you save the cost of replacing set-up wheels.

Behr-Manning Application Engineers, in laboratories fully equipped and strategically located, are constantly solving new grinding problems. Bring yours to them. Write us to put you in touch.



BEHR-MANNING • TROY, N.Y.

NORTON abrasives

ALSO QUALITY OILSTONES FOR INDUSTRIAL NEEDS

## •GEAR PRODUCTION

### Cutting-Shaving Checking-Lapping

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. • DETROIT 12, MICH.

### Form-Tools Cut Machine Time On Pump Gears 90%, Improve Precision

Gar Wood Industries, Inc., Wayne, Michigan, is currently producing all five of its major hydraulic pump gear types on a single Michigan Shear-Speed, followed by shaving on a Michigan rotary gear finisher. This setup has the following advantages:

 Sharply reduces cutting time (only 93 seconds for gear "E" against 18 minutes for hobbing).

Tooth spacing, so important and relatively difficult to maintain in pump gears, is automatically maintained by the multiple form tools of the Shear-Speed, even on the coarsest pitch gears having a minimum of overlap.

 Distortion and difficulty in holding the work is eliminated since cutting pressures are completely balanced by cutting all teeth simultan-

eously, with radial feed.

 Accuracy of tooth form is easily maintained since this depends primarily on the accuracy to which the form tools were ground initially.

which the form tools were ground initially.

5. Output per grind of tools is approximately doubled, reducing the number of tool changes during a given production run. Design of tools permits between 40 and 50 grinds, removing .015 each time.

Fig. 1 shows the 5 types of pump gears (for specifications, see table below). Gear "A" is produced in two cuts, the roughing and finishing tools shown being interchangeable in the same cutter head. Gears "D" and "C" are also cut in two steps. However, two "C" gears are cut at one time with the blanks stacked one above the other. Metal removal on "C" and "D" is almost one-half of total blank weight.

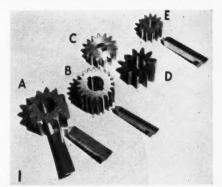
Fig. 4 shows the cutter head, finished gear and blank for gear "E." The Shear-Speed is shown in Fig. 2, with

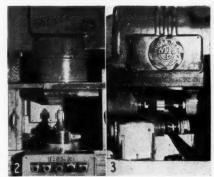
one of the three gear shavers in Fig. 3.

Pump outputs range from 13½ to 52 gpm at 800 psi and 1000 rpm for these gears. Finished gears are so accurate that the 13½ gpm pump will actually deliver up to 17 gpm at 1000 psi and 1000 rpm.

Gear (See Fig. 1)	No. of Teeth	Out- side Dia.	Face Width	Dia- metral Pitch	Pres- sure Angle	Pump Use	No. of Opera- tions
A	12	3.645	23/4	3.8052	35°	Road Mach.	2
В	20	3.487	23/4	6.342	20°	Road Mach.	1
C	14	3.192	11/4	5.000	221/2°	Hoist	2*
D	10	3.195	21/4	3.8052		Load packer	2
E	12	2,332	15/8	6.000	221/20	Hoist	1

-Two gears cut at one time, however.







For Shear-Speed machine details, write Michigan Tool Company for Bulletin SS-48-2.

### Based on Bearing Performance Records



# Westinghouse says

## "do away with lubrication costs"

#### IN THEIR LIFE-LINE MOTORS

"Forget old-time ideas about the care and greasing needed to keep motors running!

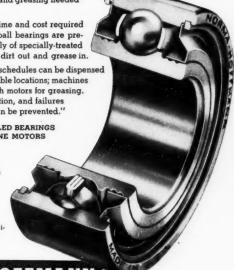
"Life-Line motors now eliminate the time and cost required for lubrication. Life-Line double-width ball bearings are prelubricated with a more-than-ample supply of specially-treated lubricant — and factory-sealed to keep dirt out and grease in.

"Periodic weekly or monthly greasing schedules can be dispensed with. Motors may be installed in inaccessible locations; machines no longer need be disassembled to reach motors for greasing. Winding failures caused by overlubrication, and failures caused by use of improper lubricants, can be prevented."

#### NORMA-HOFFMANN "CARTRIDGE" SEALED BEARINGS ARE USED IN WESTINGHOUSE LIFE-LINE MOTORS

With their extra large initial grease supply, made possible by their double width and with highly efficient seals insuring against grease leakage, Norma-Hoffmann "Cartridge" bearings give years and years of service without relubrication. They are prepacked with a carefully metered volume of oxidation-resistant and wide temperature range grease.

Whether you are building motors, machine tools, pumps, fans or other equipment, let our Engineers show you how you may eliminate lubrication costs and simplify your designs by using these "neglect proof" Cartridge ball bearings.



NORMA-HOFFMANN Precision BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION . Stamford, Connecticut



### PRECISION COLLETS for ALL MACHINES

#### **Hardinge Collets for Lathes**

American, Ames, Boye & Emmes, Carroll & Jamieson, Chard, Cincinnati, Cisco, Elgin, Greaves-Klusman, Hamilton, Hardinge, Hendey, Jones & Lamson, LeBlond, Monarch, Porter Cable, Pratt & Whitney, Rahn-Larmon, Reed-Prentice, Rivett, Rockford, Sebastian, Seneca, Sheldon, Sidney, South Bend, Springfield, Stark, Sundstrand and Van Norman. Collets for all sizes of Cushman Chucks and Hardinge-Sjogren Speed Collet Chucks.

#### **Hardinge Collets for Millers**

Ames, Becker, Burke, Elgin, Hardinge, Kearney & Trecker, Pratt & Whitney, Reed-Prentice, Rockford, Stark, Sundstrand, Van Norman.

Write for Bulletin No. 48 for complete ordering information, dimensions and prices.



## HARDINGE COLLETS FEED FINGERS FEED FINGERS

#### For Automatic Screw Machines

Hardinge Collets, Feed Fingers, Master Collets, Master Feed Fingers, and Pads for Automatic Screw Machines, Brown & Sharpe, Cleveland, Cone, Davenport, Greenlee, Gridley, Acme-Gridley, National-Acme, New Britain.

#### For Turret Lathes

Hardinge Collets for Turret Lathes—Acme, Bardons & Oliver, Cincinnati-Acme, Foster, Garvin, Gisholt, Jones & Lamson, Logan, Morey, Oster, Pratt & Whitney, Simmons, Warner & Swasey.

Write for Catalog No. 36 for complete ordering information, dimensions and prices.

ONE SOURCE OF SUPPLY - STANDARD SIZES IN STOCK FOR PROMPT DELIVERY

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

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BECAUSE P&J TOOLING IS PRECISION BUILT



## fewer rejects

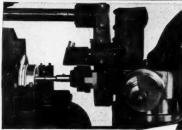
## FROM PA AUTOMATICS

The automotive industry applies Potter & Johnston Automatic Turret Lathes extensively to quantity production of interchangeable parts, many so intricate that they require upwards of fifteen to twenty successive operations on one machine. Significantly, the modern quality control inspection methods used in the big automobile plants demonstrate the ability of P&J Automatics to produce work that meets these exacting standards . . . with fewer rejects.

Back of this successful performance record is P&J tooling...as planned with the aid of experienced P&J engineers who know how to work out a job—as indicated by these setups to produce the differential case pictured above—operation by operation in correct sequence, turret face by turret face. There is no substitute for the skill and know-how of these men. That is why Potter & Johnston machines plus P&J tooling mean better parts and more of them at lower cost. And that is why we suggest that it may be very much worth your while to send us sample parts or prints and see what we have to recommend.





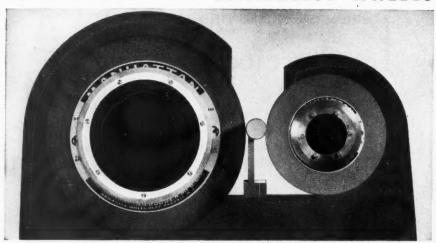


Potter & Johnston Company

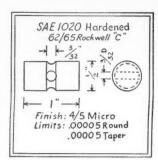
AUTOMATIC
TURRET LATHES

Pawtucket, R. I.
subsidiary of Pratt & Whitney
Division Niles-Bement-Pond Company

## Performance Proves the Zuality of RUBBER BONDED MANHATTAN CENTERLESS



## ROUGH AND FINISH with SAME WHEEL



Regulating Wheels - Plain - Core Mounted - Manhattan Core Mountings Effect Substantial Savings Example #1: Roughing and Finishing 1/2" dia. x 1" long SAE 1020 Pins (Soft and Hard)

Performance of 20x6x12-4660 Q64 KLE Wheels

Rough soft-2 passes .005/.006 each-hold tolerance to .0002 Rate of feed 70 pieces/min.-Grinding wheel speed 1200 RPM Pins hardened at this point to 62/65 Rockwell "C"

Finishing hardened—Filmatic Bearing Machine—wheel speed 1600 RPM

3 passes .001/pass for sizing and rounding up Final pass .0015-3 to 4 micro finish-hold tolerance-

### Example #2: Roughing and Finishing Miscellaneous Materials

Performance of 20x6x12—80100 Q52 BV5 Wheels at 1200 RPM. On all these jobs wheels held good size with infrequent dressings:

5/8" dia. x 12" long SAE 1020 Soft Rod

3 posses—008, .004 and .001 to 4 or 5 micro finish
1/2" dia. x 5/8" long Hardened Steel Bushing
Infeed—008 removal—very good finish and size
1/4" dia. x 8" long—Stainless Steel Bars
2 passes—010/.012 and .002/.003 to excellent finish



## RAYBESTOS-MANHATTAN INC.

Keep Ahead with Manhattan

MANHATTAN RUBBER DIVISION

PASSAIC, NEW JERSEY



THE cost of facing pistons in the plant of one of America's big automobile makers was cut 50% by the addition of Bellows "Controlled-Air-Power" Devices to a standard lathe. One Bellows Air Motor feeds the tail stock, while a second, controlled by the Bel-

lows Hydro-Check, operates the cross slide. Not only was production substantially increased but rejects were materially lessened, tool life increased and worker fatigue reduced to a minimum.

Experiences such as this are common in plants where Bellows "Controlled-Air-Power" Devices are used to make manually operated machines almost completely automatic.

You, Too, Can Cut Machining Costs With "Controlled-Air-Power" Write For Bulletin CL-15 Today

CUTS COSTS OF FACING PISTONS
50%

Write for your free copy of the new Bellows Booklet telling how you, too, can cut machining costs with Bellows "Controlled-Air-Power." Address: The Bellows Co., Dept. MMS 549, Akron 9, Obio.

The Bellows Co.

Akron, Ohio

# gts got a "pull!"



The drive of the Series 200 Clausing Lathes will pull your load. It is soundly engineered from the motor to the lathe spindle. It is this design that gives it an advantage. Speed changing is done at the point where there is a torque advantage. After the speed change station the power goes directly to the headstock spindle through a twin belt drive. No power can be lost after it has utilized its torque advantage. Then there are the usual back gears for your slow heavy pulls. For further details write for circular.



74

CLAUSING MANUFACTURING COMPANY

229 Richmond Ave., Ottumwa, Iowa.

TAKES

Overall

80" high,

platen to

inhighest

# 

# IF YOU WORK WITH METAL, THIS NEW KRW FORGING AND FORMING PRESS IS PRECISION-BUILT FOR LONG OR SHORT RUNS PRICES\* RANGE FROM ONLY \$1850 TO \$1910!

• Here's a brand new dual purpose Hydraulic Press that fills a long felt need by many plants. This new 75-ton press can be used on many forming and cold forging or pressing operations. It is easily shifted from one set-up to another; can be used with inexpensive dies to do a wide variety of work . . . relieving heavier equipment for other work. The press is GUARANTEED for ONE YEAR against defects in material or workmanship. Here are some of its features: adjustable bed, platen is precision ground. Equipped with 2-speed built-in hand pump for die try out and delicate pressing. Mechanite Cylinders precision machined

and honed to mirror finish. Guided ram to prevent ram swiveling. Get the facts about this latest KRW press development.

There's a place in your plant where it can save you money.

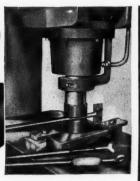


Illustration shows the press being used to cold form an automotive valve lifter.

#### BRIEF "SPECS"

Standard Model, Series 3700-F. 75-tons.

6" ID Cylinder, 7¼" stroke.

Platen 30"x 18"x 2", adjustable in 4" steps.

Daylight 6" Min. to 18" Max. Frame Heavy welded steel.

11" stroke cylinder available in air return or double acting types.

Ram Travel Speed varies from 1" per 3.5 seconds to 1" per 2.6 seconds depending upon capacity of hydraulic equipment selected.

Delivery: Standard models one week.

\* Depending upon capacity and size of hydraulic equipment and motor required. F. O. B. Factory.

TAKES

LITTLE SPACE Overall Dimensions: 80" high, 53" wide, 40"

front to back. Top of

platen to floor when inhighest position 42".

MAIL COUPON TODAY FOR ALL THE FACTS

**K·R·WILSON** 

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please quote me prices and information on your new 75-ton Series 3700-F Press.

Name .....

Address

# HANNIFIN SERIES RI AUTOMATIC LUBRICATOR

# Use AIR that's LUBRICATED!

STOPS WEAR — Here's how to make cylinders, tools, and other air operated equipment work better and last longer. Use this new Hannifin "Air Warden" Unit! Adds atomized oil to air stream. Ends worry about lubrication of inaccessible parts.

GUARDS AGAINST RUST—Leaves film of oil covering all internal surfaces to protect against rust when equipment is shut down and idle.

**SAVES TIME** — Works automatically. Minimizes manual maintenance requirements. Oil supply always visible through transparent bowl. Positive shut off for filling without interrupting air flow.

ECONOMICAL—Provides effective lubrication without waste. Uses oil only when air flows. Feed rate accurately controlled, visible, and fully adjustable. 1/2" and 1/2" sizes. Send for information about Hannifin "Air Warden" equipment. HANNIFIN CORPORATION, 1101 So. Kilbourn Ave., Chicago 24, Illinois.

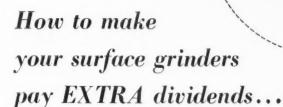
–The "Air Warden" Line-



"IT DOES THE

76

The Versatile No. 616 Cylindrical Grinding and Indexing Attachment





Here's an efficient, economical way to employ your surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing . . . equip them with Brown & Sharpe No. 616 Attachment. With this portable attachment, straight cylindrical or tapered work is ground between centers or, if ½" diameter or less, work can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Look to the No. 616 Attachment for increased returns on your surface grinders. It's inexpensive, compact, precision-built. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

No. 616 Attachment in use on Brown & Sharpe No. 2L Surface Grinding Machine. Capacity of Attachment: centers swing 6" diameter; take work 5\%" in length. Maximum grinding angle, 45°.

We urge buying through the Distribut

## What makes a broach



At right, index and spacing checker for spline or serration broaches. Also checks lead. In front, special surface plate to check alignment. Note comparator in background for checking complex contours on broached samples.



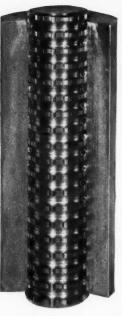
Metallographic analysis of heat-treated specimens (taken at different radii on large broaches), precedes fabrication.



physical lab provides facilities for metal analysis. Operated by trained technicians.



Test pieces produced dur-A complete chemical and ing the grinding of involute sical lab provides facilities splines on broaches are checked on this Michigan Tool involute checker.



**GOOD**;

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Typical of Colonial's continuous research on chip characteristics and the effect of various factors such as material, pitch, breaker spacing, etc., is this study on "deep hole" spline broaching.

GOOD broach is about the most inexpen-A sive tool you can buy—based on the number of finished pieces which it will produce. On the same basis, a poor or mediocre broach can be a costly investment, no matter what you pay for it.

Colonial's ability to consistently design and produce GOOD broaches is no accident. It is a matter of constant vigilance—checking and re-checking at every stage—plus the finest of inspection "tools". Here are some of the facilities that make Colonial broaches GOOD broaches.

For the name of Colonial's representative in your area, write (Box 37, Harper Sta.), wire, or phone (LA. 7-1600) today.



Colonial Makes 6000 Broaches



JIG GRINDING

<u>Vulcanaire</u>

W HEN Jig Grinding is required you can have it quickly and economically with the Vulcanaire. Place in the spindle of your Jig Borer (or Mill).

AND YOU CAN . . locate—finish grind holes in hardened steel to "tenths" at controlled speeds up to 65,000 R.P.M. . . grind dowel holes—square with a ground base . . move location of holes in hardened steel blocks . . grind interchangeable holes in hardened sections . . grind .032 to "holes with diamond impregnated laps . . grind contours and relief with tungsten carbide burrs . . grind radii in die sections . . grind contours in gages . . jig grind large and awkwardly shaped components . . eliminate jig bushings in tools where close spacing is essential.

RESULTS! Jig ground requirements are being designed into tools by the most enlightened engineering departments. Jig ground the hardened die, stripper plate, and die holder all fit together. uniform clearance means longer runs.

ADVANTAGES! the investment is less than for many Jig Boring accessories such as a rotary table . . the Vulcanaire can be put on and taken from the machine in a few seconds . . the Vulcanaire is completely portable (all accessories are platform mounted) . . the system can be used between several machines of various capacities . . employing both

the 10,000 and 20,000 series, components with various sized holes from the very smallest to 4" in diameter can be Jig Ground . . the average Jig Borer operator becomes proficient at Jig Grinding after very little experience.

TOPS IN PRECISION . the Vulcanaire is precision built throughout and is constructed of alloy and tool steel. Super precision bearings, preloaded with our special fixtures are used, with all traces of radial and end clearances removed, resulting in Vulcanaire Jig Grinding to "tenths" . for quotation and literature please mention machine tool application.

## **VULCAN TOOL CO.**

731 Lorain St. Dayton 10, O.

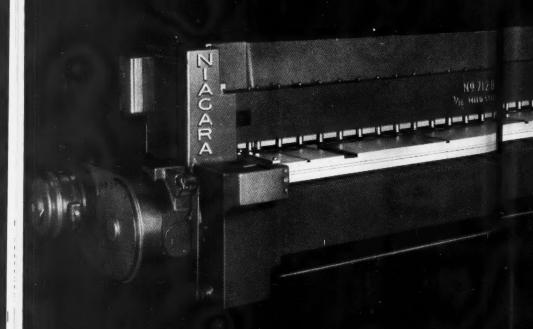






# 70 YEARS of

TALENT and EXPERIENCE Behind the DEVELOPMENT of



NIAGARA MACHINE & TOOL WORKS . BUFFALO 11, N. 12151

NIAGARA

America's Most Complete Line of

PRESSES
SHEARS
MACHINES
and TOOLS

for Plate and Sheet Metal Work

## **SOUTH BEND 9" LATHES**



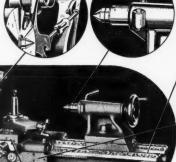
Bearings are line bored and bearingized. Ample lubrication from oil reservoirs. Spindle is hardened and ground, bearing surfaces super-finished to .000005" rms.

Instant release of belt tension for speed changes. Proper tension of headstock spindle drive belt is easily adjusted.

TAILSTOCK

Has set-over for taper turning. Graduated spindle has witness mark for aligning cutter bit. Center is self-ejecting.

Three V-ways and one flat-way are hand-scraped entire length for precision alignment of headstock, tailstock, carriage.



APRON

Has powerful friction clutch and large halfnuts. Safety interlock prevents engaging opposing feeds. All gears machine cut.



**REVERSE GEARS** Easily shifted for reversing lead screw rotation and feeds, positive lock. All the gears used in this lathe are machine cut. **GEAR BOX** 

Screw threads and power feeds selected by shifting two tumblers as indicated on index chart. All gears machine cut steel.

CARRIAGE

V-ways and dovetails hand-scraped. Engine divided micrometer collars on feed screws. Com-pound Rest base is graduated 180°.

## Specifications ...

South Bend 9" Model A Lathe

Swing . . . : . . over bed - 9-1/4" over cross slide - 5" Bed Lengths, 3, 3-1/2, 4, 4-1/2 feet Center Distances . . . . 16" to 34" Spindle Speeds, 41 to 1270 r.p.m. Power feeds:

Longitudinal (48) .0015" to .0853" Cross-feed (48) .0004" to .0252" Threads (48) . . 4 to 224 per inch Maximum Collet Capacity, 1/2 inch Spindle Bore . . . . . . . 3/4 inch Tailstock Top Set-Over . . 5/8 inch

### SOUTH BEND LATHE WORKS 427 E. Madison St., South Bend 22, Ind., U.S.A.

Please send catalog(s) checked:

☐ 7" Shapers ☐ Attachments

□ 9" Lathes
□ 9"-16" Lathes
□ 14" Drill Presses

☐ Time Payments

STREET

CITY

STATE

9" x 3' Model A Bench Lathe, (Cat. No. 644-Y) with motor, less bench \$34045\*

Time Payments, \$85.45 down, \$22.52 for 12 months.

Other South Bend 9" Lathes, priced at \$187.35\* to \$805.45\*, may also be purchased on terms. \*Prices, f. o. b. factory, include 1 phase, 60 cycle, 115-volt motor and control.

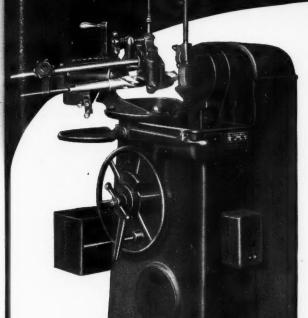


SOUTH BEND LATHE WORKS

BUILDING BETTER TOOLS SINCE 1906

MODEL 6-G

## SELLERS DRILL GRINDER



### QUICKLY PAYS FOR ITSELF IN DRILL MAINTENANCE SAVINGS

#### **■** INCREASED PRODUCTION

Free cutting accurate drills permit drilling machines to be operated at their most efficient speeds.

#### • LONGER DRILL LIFE

Less drill material is ground off when resharpening drills.

#### MORE HOLES PER GRIND

Correctly ground—drills remain sharp for a greater number of holes.

#### REDUCED ASSEMBLY COSTS

Eliminates under- and over-size holes. Saves reaming and boring.

#### RECLAIMS DAMAGED DRILLS

Sellers grinding method reclaims many burned and broken drills that are ordinarily scrapped.

#### @ ECONOMICAL

This Sellers Grinder has been known to have earned its original cost as many as six times over within a single year.

BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
COLD SAW MACHINES
DRILL AND TOOL
GRINDERS
PLANES
PLANES
PLANES

Among Heavy Machine
Tools built by
Consolidated are

SLOTTERS
RAHROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

The Sellers 6-G Drill Grinder provides an improved method of grinding that produces correctly formed drill points and duplicate lips. It automatically determines proper clearance according to drill size and grinds drills to equal length for use with multiple spindle drilling machines. This method materially reduces drill maintenance costs. A wet grinder that is especially adapted to grinding high speed twist drills from 1/4" to 3" diameter.

Send for complete information

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS . BETTS-BRIDGEFORD . COLBURN . HILLES & JONES . MODERN . NEWTON . SELLERS



CONSOLIDATED



## ve Centers

On both light and heavy turning jobs, users report that . No Gouging or IDEAL Live Centers are consistently cutting costs as much as 50%—with lathe and man-hour output both up sharply. Accuracy Burning \* Deeper Cutsis improved too-because IDEAL Live Centers eliminate "center problems"-allow the operator to concentrate on the cutting Faster Speeds operation.

> Because there's no friction between center and work, IDEAL Live Centers never gouge or grab, never overheat. No more chatter, center lubrication, or burn-outs! Maximum rigidity and accuracy is assured by unique bearing arrangement and bearing seal that keeps out cutting oil, dirt and chips . . IDEAL Live Centers are a 2-to-1 favorite over all others—and have been for many years. Ask your IDEAL Distributor for the full facts-NOW!

## (DEAL) DUST COLLECTOR

Safeguarded

Accuracy · No Spoiled

Work



Easy to in-stall. Efficiently removes abrasive dust, metal particles, etc. Two inlets, 500 cfm. capacity. Recirculates warm airsaves heat.

## DEMAGNETIZERS



Simplify demagnetizing of work from magnetic chucks, also tools, drills, etc. Increase service life of tools. Three sizes, up to 15 amp.

### (IDEAL) ETCHERS

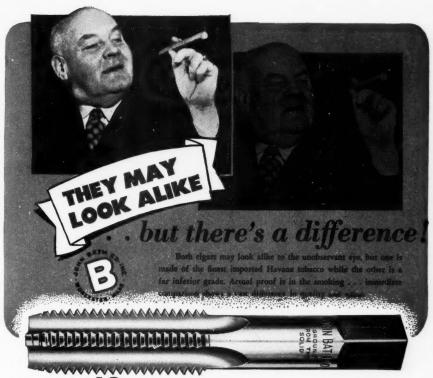


Burns smooth, permanent mark in anything made of iron, steel or their alloys. Eliminates expense of name plates and tags. Pays for itself. Three models.

Distributed through America's Leading Wholesalers



IDEAL INDUSTRIES, Inc., Sycamore, Illinois Canadian Distributor: Irving Smith, Ltd., Montreal



## THERE IS A DIFFERENCE IN TAPS, TOO!

All taps may look alike at first glance but the superior quality of BATH taps is proved by their efficient performance. Ground from the solid AFTER hardening, BATH taps have a uniform thread structure that is strong and accurate.

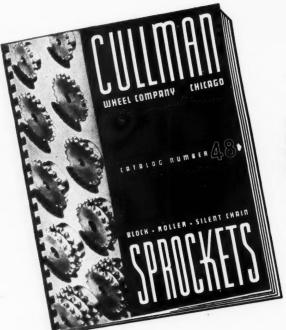
Today, with production costs so important, more plants are specifying quality BATH taps for greater speed on the job . . . for more holes per tap and for longer runs between sharpenings.

Regular stock types and sizes are available or if you need taps of a special size or for working different materials, you'll find BATH representatives highly resourceful and BATH engineers widely experienced in unusual threading problems. Write, giving complete details...we'll be glad to tell you how to get the lowest cost per tapped hole.

INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS-PERFORMANCE

PLUG AND RING THREAD GAGES . GROUND THREAD TAPS . INTERNAL MICROMETERS





OVER 80.000 SPROCKETS IN STOCK

## THE PRESS!

 Cullman Wheel's new catalog, comprising eighty pages of unusually instructive data is yours for the asking. Rarely has been such a mass of instructive technical data on sprockets, block, roller, silent chain and speed reducers produced in catalog form. In addition to thirty pages containing photographs, are some seventy pages of elaborate specification tables for quick buying reference. Better send for it at once!

> Cullman Wheel Company also produces a line of Speed Reducers for motors from 1/4 to 15 H.P.

GULLMAN WHEEL CO.

1352 V ALTGELD ST.,
CHICAGO 14, ILLINOIS

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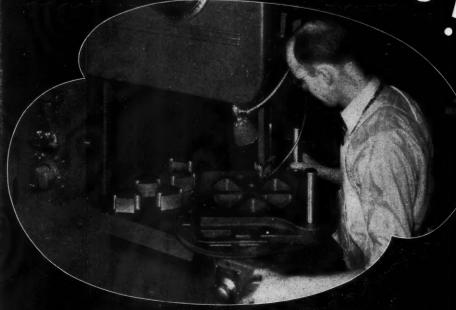
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# Slash Die-Making Cost with Contour Sawing

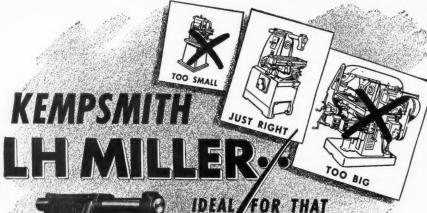


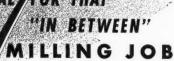
• Needless waste of time and money spent in making blanking dies, by using old "blacksmith method" of drilling, chipping and filing, is eliminated by DoALL Contour Sawing. Often both die and punch are sawed simultaneously from one piece of tool steel. Accuracy to within .005" of layout lines possible. Band files for internal and external filing also available. License for Continental Process of die-making goes with purchase of DoALL Contour Saw. Send today for circular entitled "Contour Machining".



DoALL Co.

**World-Famous Contour Saws** 





Yes — It's a light, horizontal milling machine — but RUGGED and DEPENDABLE like all Kempsmith Millers. Designed primarily to bridge the gap between low range hand millers and big, expensive machines, the LH MILLER combines simple, sound and rigid construction with flexibility and versatility — ideal for small end milling, high speed jig boring, keywaying, oil grooving, light straddle milling, etc.

CUTS COSTS IN 3 WAYS—(1) Lowest initial investment and maintenance cost (2) Lowest possible setting up and tearing down time (3) Lowest power consumption. In addition, you are assured of the highest degree of accuracy and rigidity.

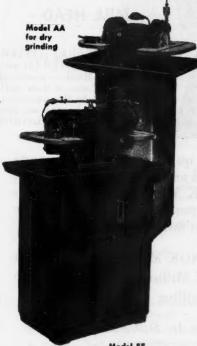
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THE KEMPSMITH MACHINE CO., 1835 SOUTH 71st STREET, MILWAUKEE 14, WIS., U. S. A.

## KEMPSMITH

• Precision Built Milling Machines Since 1888 •

# GRIND TOOLS TO EXACT ANGLE



Model EE for grinding wet or dry

## PROSSER CARBIDE GRINDERS

YOU GET the grinding angle you want instantly with the famous indexing feature of these Prosser high-speed grinders. The quick-acting tables need never be raised or lowered—and once set, they stay put.

ECONOMICAL—You'll save time and you'll get more for your wheel dollar with a Prosser because wheels are easily adjusted to compensate for wear. Wheels can be used up practically 100%.

VERSATILE—Designed by the same Prosser engineers who introduced cemented carbide to American industry, today's Prosser Carbide Grinders are equally effective on stellite and high-speed steel.

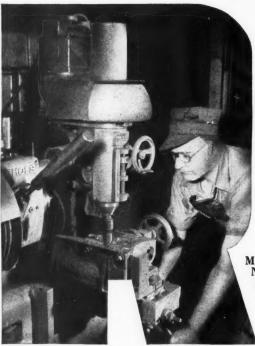
Before you get a grinder for rough work or fine finishing, wet or dry...get the facts on the Prosser. For details on bench and floor models, on chip-breaker, drill-grinding and other attachments... write for literature.

DEALERSHIPS AVAILABLE

THOMAS PROSSER & SON

Established 1845

120 Wall Street, New York 5, N.Y.



## INTERNATIONAL HARVESTER

KEEPS'

MILLING MACHINES PRODUCTIVE

WITH

## RUSNOK

MILL HEAD

MILWAUKEE WORKS; INTER-NATIONAL HARVESTER CO. uses RUSNOK Mill Head as a vertical attachment on one of their milling machines. In this operation, it is milling a boss on the side of an International Harvester Diesel pump housing.

RUSNOK heavy duty Mill Head quickly and easily converts your horizontal mill to do vertical or angular milling, drilling and boring operations. RUSNOK Milling Attachment takes the place of costly, special equipment — uses no valuable space, just install on your present mill.

Write for name of nearest RUSNOK Mill Head dealer. Let him show you how the RUSNOK Milling Attachment can be an important part of all your milling operations.

A Few Choice Dealerships Are Still Available

HEAVY DUTY

RUSNOK

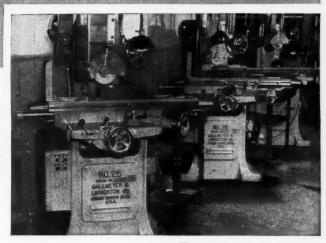
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MILLING . DRILLING . BORING

RUSHOK TOOL WORKS . 4840 W HORTH AVENUE . CHICAGO 19. 111

# Enthusiastic Customers do our BEST advertising

In one of the world's largest electrical equipment plants, three of a battery of eight Grand Rapids No. 25 Hydraulic Feed Surface Grinders precision grinding lamination dies for motor stators.



You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

- 1. One-piece column and base casting for vibrationless rigidity
- 2. Precision ball-bearing spindle which is greased for life
- 3. Bijur one-shot lubrication system eliminating hand oiling
- 4. Patented vertical movement of wheel head for quick, accurate adjustments
- 5. Portable coolant tank for ease of coolant replacement
- 6. Vane type hydraulic pump for fast longitudinal table travel

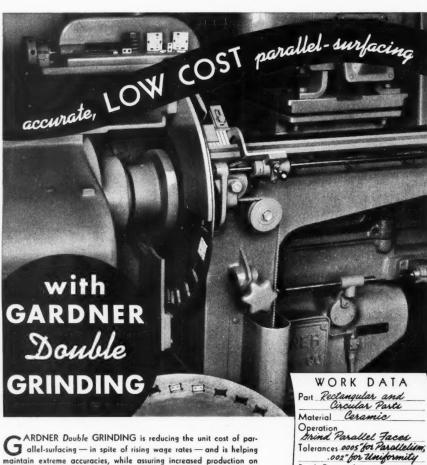
GRAND RAPIDS GRINDERS

to some you-

Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Prill Grinders, Tap Grinders, and Combination Top and Drill Grinders.



308 Straight, S. W., Grand Rapids 4, Mich.



dozens of jobs.

A typical example, in the ceramic industry, is shown above. The trough-type feeder, rotary work carrier and automatic unloading arrangement make this Gardner No. 115-15" Double Grinder, a purely semi-automatic tool. TWO sides of each part are ground with ONE pass through the machine.

Let our engineers recommend a GARDNER Double GRINDER that will do more accurate, lower-cost parallel-surfacing for you!

Stock Removal .018" maximum Overall

Production 40 to 50 Pieces Per Minute Feed Hand Boad to Trough feeder: Automatic Unload

Machine Bardner #115-15" Double Grinder

GARDNER - GRIND YOUR Flat SURFACES

Write for Latest Bulletin on Gardner DOUBLE Grinding!

DNER MACHINE COMPANY 428 East Gardner Street + + + Beloit, Wisconsin, U.S.A.

## Now... Butterfield's

Tools
Include the
NEW
FLEX-RITE
REAMER!

Your production-reaming problems will be greatly simplified with Butterfield's new Flex-Rite reamer. Greater accuracy...lower costs...and higher production rates are made possible by Flex-Rite because the blade-expansion feature permits repeated sharpenings while maintaining original size 100%.

And remember, like all Butterfield tools, Flex-Rite reamers are 100% inspected ... because only 100% inspection makes quality certain.

See this latest addition to the Butterfield line at your nearby distributor. Union Twist Drill Company, BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec.





## di-acro PRECISION MACHINES

Eliminate dies . . . speed production . . . in both your experimental and quantity run duplicating operations. An unusually wide variety of both simple and intricate parts can be precision made by "DIE-LESS DUPLICATING" with the individual or co-operative application of DI-ACRO Precision Machines (see examples at right). DI-ACRO Machines are now offered in a total of six types and 21 different sizes, including two new units—a power driven Shear and a hydraulic Bender.



## SEND FOR 40 PAGE CATALOG

ENGINEERS — DESIGNERS — PRODUCTION MEN should all have this informative catalog which contains technical data covering DI-ACRO Machines and our offer of "Die-Less Duplicating" Engineering Service to aid in solving design and production problems. WRITE FOR YOUR COPY TODAY.

**←** Pronounced "DIE-ACK-RO"



## O'NEIL-IRWIN MFG. CO.

306 8th Avenue . LAKE CITY, MINNESOTA

## NEVER BEFORE

A SURFACE GRINDER LIKE THIS

The most important
Surface Grinder
development in years!
LEACH 6X12
SURFACE GRINDER

ONLY

\$48500

COMPLETE WITH MOTOR

F. O. B. PROVIDENCE, R. I., U. S. A.

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## ODER

MAY, 1949

Vol. 21, No. 12

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By John E. Wakefield

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A review of the new American Standard for Unified Threads on whose nominal dimensions and limits of size agreement has been reached between the United States, Great Britain and Canada. Page 110.

### An Analysis of Blanking Die Designs, Part II

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By R. F. Stucker and R. Fogarty

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In this article, Mr. Bird discusses the factors which must be considered in making provisions for job security. Page 154.

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# Recent Developments in Metal Spraying

## Discovery of Self-Bonding Metal Points to Wider Application of Metal Spraying Process

By John E. Wakefield

URING the nearly 20 years that metallizing has been commercially available here in the United States, the process has been most widely used in rebuilding worn or undersize mechanical parts. Little by little, however, manufacturers of machinery are using the process on new equipment. For example, the General Electric Company recently advertised a new turbine, and among the special features listed was the shaft which is now protected by sprayed Monel at the packing gland zone. The Westinghouse Electric Corporation advertised a similar metallizing technique back in 1941 but were using a high chromenickel steel. Those two advertisements are milestones in the history of metallizing because for the first time mention is made of metallizing as a mechanical feature.

Actually, this is a highly practical application for the process. Only the packing zones are subjected to the effects of corrosion and wear together. The rest of the shaft operates under

quite ordinary conditions. It's certainly logical to make such shafts out of easily machined material and then protect the critical areas by spraying them with a more durable metal. It is interesting to note, however, that two of the largest manufacturers of steam turbines are using metallizing as a part of their products. It shows that the process has come a long way in the last few years.

Research into sprayed metals themselves, their structure and characteristics, promise more for the future. In fact, research has led to several recent developments which are important to users of metallizing. The value of the process for both repair of worn parts and construction of new ones is steadily increasing. Let's look into those developments and see what they amount to.

## Self-Bonding Undercoat

To machine shop men, the most important development is the discovery of a metal which bonds itself to the



Fig. 1—View of stainless steel pump shaft showing worn areas which were subsequently built up by means of metallizing.

Fig. 2 — Exceptionally good surface finish is obtained on textile printing rolls that have been coated with aluminum-iron bronze.

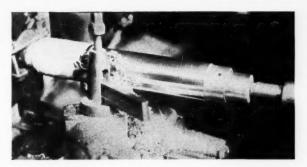
base when sprayed. This discovery changes the whole picture of preparing shafts, rods, journals, packing areas

and the like. Instead of deep undercuts, elaborate methods of grooving and knurling, all that is necessary now is to take a light, fast roughing cut to clean and true up a shaft, spray .002 inch of the self-bonding material as an undercoat and proceed with the

metallizing operation.

To illustrate clearly the difference between the best previous method and the new technique, let's take the pump shaft shown in Figure 1. The two 6 inch worn packing areas on this 2 inch shaft are typical. This shaft was of stainless steel and worn about .080 inch on the radius at the deepest place. First, let's see how this shaft was done in 1946, and then how an identical one was metallized recently using the self-bonding undercoat.

In using the old method, the worn area was machined down to 1.800 inch. Shoulders of the undercut section were dovetailed at an angle of about 20 degrees. A square threading tool was ground .045 inch wide and the corners stoned to prevent fracture lines and leave a slight fillet at the bottom of the threads. The threads were cut 14 to the inch and to a depth of about .020 inch. It took four cuts to reach the proper depth. Then, a special knurling tool, consisting of five sawlike blades with teeth set staggered to produce a very irregular cut, was run over the threads. Three or four light passes were made until the threads were well roughed up and their edges



rolled slightly. This machining operation produced dovetails in each thread.

The gun was set up with 18-8 type stainless steel metallizing wire and lighted. Holding the gun by hand, at an angle of 45 degrees to the work, three or four passes were made across the prepared surface. Then, the gun was changed to 45 degrees the other way and four more passes made by hand. This, of course, was necessary in order to get the sprayed metal particles down into the threads and into the dovetails. After the hand passes, the gun was mounted on the tool post at an angle at 90 degrees to the shaft. Additional passes were made with the gun carried on the lathe carriage, until the outside diameter of the shaft was built up to 2.040 inch.

The method just described produces the strongest bond for metallizing even today. It should still be used where the shaft surface is interrupted by a keyway or some other relief, and where the shaft is operated under an extremely heavy load. However, it is an elaborate and time-consuming method of preparation and quite unnecessary on most continuous surfaces like bearing and packing zones.

By applying the newly developed method to a shaft recently, several steps were eliminated. The first step, however, was exactly the same as the first step employed in the previously used method. The shaft was machined down to 1/800 inch and the

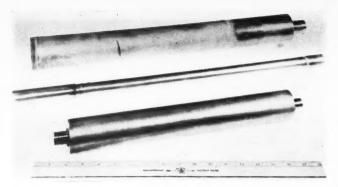


Fig. 3 — A powdered material for use in a wire type spray gun may be used to hard face workpieces of the type shown here.

shoulders were left without dovetailing. The gun was set up with the self-bonding wire, lighted and a light pass sprayed by hand. Only .002 inch of undercoat was used, just enough to cover the surface. The gun was then attached to the tool post, self-bonding wire removed, 18-8 inserted. The gun was lighted, the carriage started and the shaft built up to 2.020 inch.

It's a much simpler operation all the way around. Note, too, that the coating was built up less over the self-bonding coat than over the threads for the reason that a much more uniform coating can be sprayed. Taking the saving in finishing time on top of the drastic reduction in preparation time, the second shaft was completed in about 40 per cent less elapsed time.

The self-bonding undercoat method does not entirely replace previous methods. It should not be used where the load is very heavy, where coatings in excess of .060 inch on the radius are needed, or where the cylindrical surface is interrupted. The material will not bond to copper, brass, bronze, chrome plate or Duriron. Previous methods must still be used on these materials. The self-bonding undercoat bonds very well to all common steels. stainless steels, Monel, nickel and chrome-nickel alloys, cast iron and cast steel. It bonds strongly to magnesium and aluminum.

The self-bonding undercoating on aluminum and magnesium opens up some interesting angles. By spraying copper

over it, it is quite easy to solder magnesium or aluminum. The use of the self-bonding undercoat also means that magnesium and aluminum can now be surfaced with good wearing materials like high carbon steel or chrome-carbon stainless steel. Up to now, no good method of imparting wear resistance to these light strong metals has been found.

You might wonder why the material is used as an undercoat. One reason is its cost. The wire is a high molybdenum alloy which costs close to \$10.00 a pound. Since a coating of only .002 inch gives an excellent bond for all other sprayed metals, including copper and its alloys, it is highly practical and economical as an undercoat.

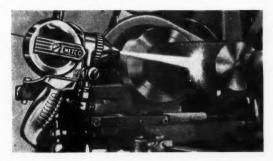
Actually, several companies are using the new metal for their entire build-up in spite of the cost. One, a well-known manufacturer of antifriction bearings, has used the self-bonding material for rebuilding grinder spindles. Results to date are excellent. Others are using the material alone on press fit sections of shafts and housings. Several of them have reported the elimination of finishing on this work. Here's an example:

A ball bearing race worked loose on a shaft, leaving the surface about .0015 inch undersize. The shaft was cleaned up with clean emery and the self-bonding undercoating material sprayed on as the shaft revolved. By careful spraying and checking, the surface was brought up to the desired fit size and the bearing race pressed back on without finishing.

So much for the undercoat. It has certainly changed the picture of metallizing for mechanical build-up work, whether for salvage of worn parts or the processing of new ones.

#### **New Metals**

Out of the research program have come two other new sprayed metals which deserve mention. One is an aluminum-iron bronze. Developed especially for metallizing, it has much greater tensile strength, wear and corrosion resistance than any previous metallizing bronze. For example, it has a Rockwell B85 after spraying, which is almost twice as hard as any previous bronze when sprayed. Besides improvement in hardness characteristics, it machines to a very high finish with almost any type of tool. One concern is known to be using this material for resurfacing copper printing rolls. These are ground to a high finish, etched with the desired pattern and used for printing textiles and other materials. After the run is completed the pattern is ground off, another etched in, and so on. This continual reduction in size renders them useless after a number of grindings. A material which is dense and produces a high finish is necessary for this type of work. Figure 2 will give some idea



of the finish that can be obtained with this new sprayed bronze.

Another new material is designed for hard facing. The material itself is available only in powder form. To make it usable in a wire type spray gun, it is mixed with a plastic material, heated and extruded in wire form. When sprayed, the plastic material volatilizes and the metal alone is deposited on the work surface. Af-

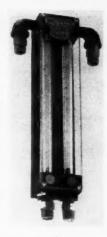


Fig. 4—Flow meters of the type shown here are used to eliminate the guesswork in setting the flame of a metallizing unit.

ter spraying is completed, the coating is fused at about 1900 degrees F. using a torch, furnace or other convenient method.

The advantage of hard facing by this method is that the spray gun deposits a very uniform coating. That means the use of less of the expensive hard-facing alloy on such parts as those shown in Figure 3. It also means much less finishing in many cases. Finishing of hard-facing materials is always a slow and expensive operation.

The method is quite practical on small parts, shafts and irregular shapes. Large parts, particularly large shafts present a more difficult problem because it is usually difficult to bring them to the proper heat without causing distor-

Fig. 5—The metallizing gun shown here may be operated on 10 cubic feet of air per minute.

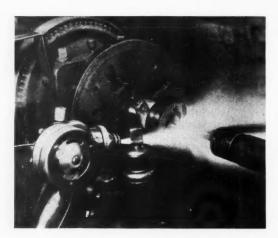


Fig. 6—Illustration showing the %inch pulley end of a fractional horsepower motor being metallized with .10 carbon steel.

tion. Furthermore, cooling without cracking is difficult on the larger parts.

The material after fusing is very hard and resists corrosion. It's a good method on certain types of pump rods. For example, an oil company in Texas was using Monel rods because of a highly corrosive acid condition. After about 60 hours of operation, Monel rods had to be replaced. Packing had to be replaced every 6 hours, approximately.

Several worn Monel rods were hardfaced with the new spraying method and material. They operated an average of 684 hours before replacement was necessary. Packing life increased to about 34 hours. Laboratory tests have shown almost no effect on the material when immersed in hydrochloric or sulphuric acids in fairly high concentrations. Bare steel sections exposed to the same chemicals at the same time showed loss of about \( \frac{1}{16} \) inch of metal in the same length of time.

These two, with the self-bonding undercoat, are the contributions to date in better metals for metallizing. Others will be developed as time goes on, without a doubt. Better metals, with predictable characteristics after spraying mean a lot to better maintenance operations and the surfacing of new products.

### Gas Flow Meter Unit

Here's a development in equipment which is important to the machine shop operator. Flow Meters eliminate

the guesswork in setting the flame of a metallizing unit. Even a green operator can adjust his flame correctly for the metal he wants to spray, and do it the same every time.

A typical Gas Flow Meter Unit is shown in Figure 5. Gas flows from the pressure regulator on the gas cylinder to one of the gauge glasses and through it to the gun. The other glass handles oxygen in the same way. Floats in the tubes are raised as the gas and oxygen pass into them. The tubes are marked with lines much like a thermometer. Charts are available showing just the right level for both gases to give a properly balanced flame for each metal sprayed. All the operator has to do is light his gun with an approximate flame balance and manipulate his pressure regulators until the floats are at the proper levels. It's all visual and very easy to do.

There are other advantages besides making it possible to obtain exact flame balance. A balanced flame means absolutely uniform coatings with uniform characteristics. That's important on new parts like the packing gland zones of the General Electric turbine shafts. A balanced flame



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CINCINNATI 25, OHIO U.S.A. SHAPERS · SHEARS · BRAKES also gives higher spraying speeds. One user reported an increase of almost 40% after using a flow meter. That's undoubtedly a much greater increase than will be the case with most guns, but 10% to 20% seems a likely average increase.

Guesswork is always a headache in the machine shop, so anything that eliminates it is a real help. Flow meters are important in taking still another kink out of the operational problems of metallizing.

### **Metallizing Guns**

There are several relatively new metallizing units on the market. It isn't the purpose of this article to discuss their merits. However, the one shown in Figure 5 deserves mention. It operates much like other guns except that it needs less air than previous ones. This one operates on 10 cubic feet per minute. It handles smaller diameter wires than most guns and therefore operates at lower speeds. It is important to the smaller shops in spite of that. One of the drawbacks to metallizing for many companies has been the need for 25 to 35 cubic feet of compressed air a minute. Some of the companies couldn't do metallizing work without investing an extra thousand dollars in a 10 H. P. or 15 H. P. compressor. A 3 H. P. compressor takes care of this gun quite satisfactorily. Hence, the usefulness of metallizing is broadened out to many more companies. Metallizing, even with this relatively low-speed gun is often faster and less expensive than replacement or repair by other methods.

Take a worn motor shaft, for example. Figure 6 shows the % inch pulley end of a fractional horsepower motor being metallized with .10 carbon steel. It's certainly faster and far less expensive to metallize the shaft in the winding than to replace it. To replace, you have to press out the

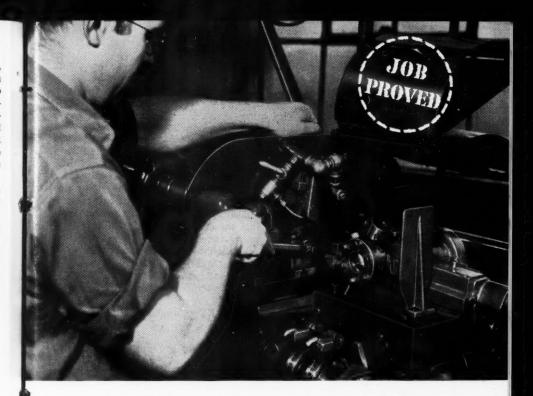
worn shaft, obtain or make a new one, press it into the winding, straighten it and all too often do a rewinding job as well. Not so with metallizing. Metallizing is a cool process. The temperature of the shaft is seldom raised above 200 degrees F. and can be kept well below that point. There is no shaft warpage, no damage to the winding.

So much for new developments that will give the machine shop men some real help toward better metallizing. There's one other subject which should be discussed. That's the wear resistance of sprayed metals. Many users have reported that sprayed materials outwear the same materials in more ordinary form. There's nothing very new about that, but research has done quite a bit toward explaining it.

### Wear Resistance and Lubrication

Wear resistance of almost any material is due to two factors; its particle hardness and its ability to maintain a film of oil. Particle hardness has been found to be much more important in this respect than the hardness of a structure as a whole. Pressed powdered metals, for example, often resist wear out of all proportion to their structural hardness, due to the fact that the individual particles are much harder than the whole. Sprayed metals are porous, and therefore much more like powdered metals than any other form. A sprayed medium chrome, medium carbon stainless steel coating shows a Rockwell C33. A micro-hardness test shows the particles to be much closer to Rockwell C 55 to C 60. That is one reason why sprayed metals wear better. Particles tend to pick up carbon in the spraying operation. They are subjected to a severe chill as they land and flatten out.

The other factor, lubrication, again goes back to the porosity of sprayed metals. The pores absorb and hold



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quite appreciable quantities of lubricant. They also provide a means of escape for the tiny metal particles invariably dislodged in the wearing-in process on any lubricated shaft. The result is 10% to 20% less friction with sprayed materials than with the same metals in ordinary form.

Speaking of oil absorption, a machine shop foreman at a rock quarry in California recently reported putting oil on a freshly machined metallized shaft. He was called away on another job for a few minutes. When he came back, no oil was to be seen. He asked his assistant why he had wiped it off. The assistant replied that he had himself put oil on the surface just a few moments before. Both applications had been absorbed into the coating.

This experience is borne out in the laboratory. Some specimens of sprayed metal submerged in oil for about 50 hours absorbed up to 10% by bulk of oil. Sprayed steel crankshaft journals operating in white metal bearings at various speeds and loads showed less friction under all tests than hardened steel crankshaft journals. When the oil supply was cut off, deliberately, the

hardened steel journals seized in about  $2\frac{3}{4}$  hours. When the same thing was done to the sprayed journals, they ran an average of  $22\frac{1}{2}$  hours before seizing.

Lubrication is a critical matter on many mechanical parts. Take textile machinery, for example. Textile plants can't use as much oil as they'd like because of danger of spoiling their products. Machine shop men in a number of plants are taking metallized roll necks, spindle bearing areas and soaking them in graphited oil. They run many times as long and won't throw oil. It looks as if the manufacturers of textile, and other kinds of machinery could take a leaf from the maintenance machinist's book.

#### Conclusions

Let's hope this little discussion will serve to bring the subject up to date, both as to what's new in metallizing and what can be done. It looks from here, after twenty years of progress in metallizing, that the process has a great deal more to offer the machine shop now than ever before.

"Tap Drill Sizes." fourth in the South Bend series of wall charts, is ready for distribution. Measuring 13 x 19 inches in size with white lettering on a dark blue field the chart covers American National Screw Thread Pitches as established by the National Screw Thread Commission, authorized by the Congress of United States in 1928 and subsequently approved for general use. Sizes of threads, threads per inch, outside diameter of screw, tap drill sizes, and decimal equivalent of drill are given for National Coarse Standard Threads (N.C.), formerly U.S.S.; National Fine Standard Threads (N.F.), formerly S.A.E.; and Special Threads (N.S.).

Other wall charts in the South Bend series are entitled "Principal Parts of a Lathe," "How to Become a Machinist," and "Decimal Equivalents." Copies may be obtained by writing to the South Bend Lathe Works, 386 E. Madison St., South Bend 22, Ind., and enclosing 10 cents in coin for each wall chart ordered.

Transformer Catalog No. TR-49. The Eisler Engineering Co., Inc., 750 S. 13th St., Newark 3, N. J., has issued a 26-page catalog with over 135 illustrations covering in systematical arrangement the development and results of 28 years of management and specialized engineering experience in the design and manufacture of transformers from 1/4 up to 400 kva and potentials up to 15,000 volts for every class of service. Contents include information on construction features and steps in the manufacture of Eisler single and three-phase oil-immersed self-cooled dry-type air-cooled distribution transformers for light and power, as well as numerous on-the-job pictures, close-up views, technical data, and electrical specifications. Information on the company's engineering facilities and its modern metal fabricating department is also included. Copy of the catalog is available to individuals addressing requests on their company letterheads.

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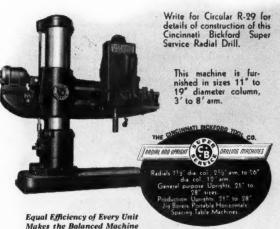
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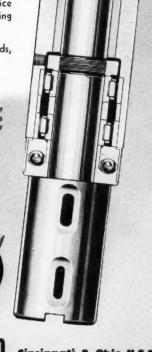
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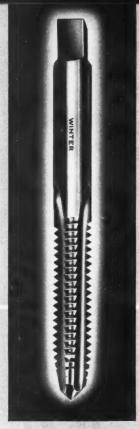
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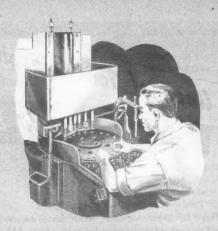
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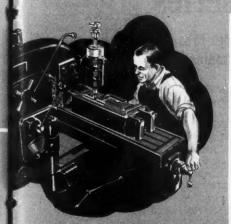
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# New American Standard for Screw Threads Presents Unified Series

# General Interchangeability with Present American Practice Is Maintained

By JOHN GAILLARD

Mechanical Engineer, American Standards Association

THE new American Standard titled Unified and American Screw Threads for Screws, Bolts, Nuts and Other Threaded Parts, B1.1-1949, was approved by the American Standards Association on February 23, 1949, as a revision of the American Standard. Screw Threads for Bolts. Nuts. Machine Screws and Threaded Parts. B1.1-1935. The new standard covers Unified threads on whose nominal dimensions and limits of size agreement has been reached between the United States, Great Britain and Canada, and American Standard threads, for some of which such a unification is still being considered.

For the sake of brevity, the term "screw" will be used in this article to designate any external thread and the term "nut," to designate any internal thread.

#### Basic Form of Thread

The basic form (maximum metal condition) of the Unified screw and nut, with a 60 degree angle of thread, is shown in Fig. 1. The screw has a rounded root and its basic depth of thread is 17/24 H (in which H is the

height of the fundamental triangle), instead of ¾ H in the 1935 standard. The crest of the thread may be flat (basic width ½ pitch) or rounded. The flat crest is preferred in American practice and the rounded crest in British practice. The root and crest of the nut are flat, with basic truncations of H/8 and H/4, respectively. The basic depth of engagement between screw and nut is ¾ H, as in the 1935 standard.

#### Classes of Thread

The system of Unified threads is based on six classes of thread, each class being characterized by the amount of tolerance, or tolerance and allowance, specified. Classes 1A, 2A, and 3A, apply to screws and classes 1B, 2B, and 3B, to nuts. The pitch diameter tolerances of all classes, and the pitch diameter allowances of classes 1A and 2A (which allowances are equal for a given nominal size) are shown in Fig. 2 for a 1-inch coarse thread. The old "classes of fit" 1, 2, and 3 of the 1935 standard are also represented. Contrasting with these

Fig. 1 — Illustration showing basic form of internal and external Unified Screw Threads.

old classes, for each of which the pitch diameter tolerances on the screw and nut were equal, a class B thread in the new standard has a 30 per cent larger pitch diameter tolerance than the class A thread with the same numeral.

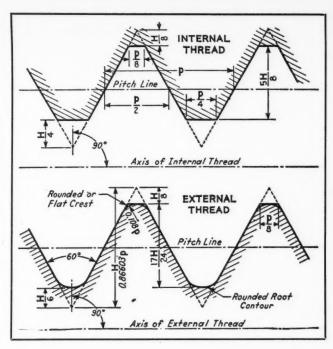
#### Origin of New Classes

The development of the A and

B classes started with the class now designated by 2A. Industry felt the need for a thread fit similar to the old class 2, but having an allowance (minimum clearance) on the pitch diameter, mainly to avoid seizure in high-cycle wrenching commonly experienced with class 2. To remedy this trouble, class 2A was established and this was matched by class 2B. The combination of 2A with 2B is expected to be satisfactory for most general purpose threads, such as used on bolts, screws and nuts. Classes 2A and 2B served as the basis for the development of two other combinations: 1A and 1B, to replace the old class 1, and 3A with 3B, giving a fit without a pitch diameter allowance, similar to old class 3.

#### **Transition Not Difficult**

The designer is free to use any combination of thread classes, new and old, suitable for his purpose. The dia-



grams of Fig. 2 show that transition from the old standard to the new should not cause great difficulty. For most practical purposes, the old class 1 can be replaced by the combination of 1A with 1B; the old class 2, by 3A with 2B; and the old class 3, by 3A with 3B. In addition, the new standard provides the general purpose combination, 2A with 2 B. To ease the transition, the old classes 2 and 3, which are widely used, have been retained in the new standard for the time being and the old class 1 (which is obsolete) is given in an appendix, for information only. Already there are indications that the old classes 2 and 3 will gradually be replaced by combinations of A and B classes.

#### **Relations Between Classes**

The relations between the pitch diameter tolerances and allowances of the new A and B classes of a given nominal size are listed in Table I, based on the pitch diameter tolerance of class 2A as unity.

Table I

Class of Thread	Pitch Diameter Tolerance	Pitch Diameter Allowance		
1A (screw)	1.5	0.3		
1B (nut)	1.95 (1.5 x 2b)			
2A (screw)	1	0.3		
2B (nut)	1.3			
3A (screw)	0.75			
3B (nut)	0.975 (0.75 x 2b)			

#### Character of Fits

The character of the fits resulting from combinations between 1A and 1B, and between 2A and 2B, is shown in Fig. 3. The combination between 3A and 3B and the old classes 2 and 3 are

represented in Fig. 4. These diagrams show also that the minimum minor diameter of the screw corresponds to a flat root with a width of ½ pitch and the maximum major diameter of the nut, to a flat root with a width of 1/24 pitch. This is the same setup as in the 1935 standard and shows that, even though the root of the basic screw is rounded, the American manufacturer may start the production of an external thread (minimum metal condition) with a tool having a flat crest.

A Unified thread is printed in bold type and is designated by a symbol beginning with the letter U indicating that it is the same as the British and Canadian threads with the same designation. The Unified Screw Threads comprise the coarse thread series, size range ¼ to 4 inches, inclusive, the fine thread series, range ¼ to 1½ inch, inclusive; and preferred special threads of the A and B classes.

Unification of the coarse thread ser-

ies involved adoption of the ½-inch size with 12 threads per inch, as given in the British Whitworth system. However, the ½"-13 thread has been retained as an American Standard. Therefore, the designer has the choice between two ½-inch coarse threads: ½"-12 UNC\* and ½"-13 NC. Unification of

CLASSES OF THREAD IN B1.1 - 1949 SCALE IN 0.0001 INCH OLD CLASSES NEW CLASSES 150 (IB) 132 NUT NUT 111 100 (3B) 50 0 BASIC PITCH 0.9188 50 101 111 100 SCREW SCREW 145 150 (1

Fig. 2—Pitch diameter tolerances and allowances of old and new classes of threads applied to 1-inch coarse thread.

<sup>\*</sup>UNC means American Standard Unified Coarse; NC means American Standard Coarse.



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the coarse thread size below ¼ inch (from 0.073 to 0.216 inch, inclusive) is still under consideration. Therefore, these sizes are listed in the new standard as NC threads.

The fine thread series has been unified by changing the pitch of the former American Standard 1"-14 thread, to 12 threads per inch. (The British have changed here from 10 to 12 threads.) However those wishing to continue the use of the 1"-14 thread will find it under the Special Threads; in the new standard. The fine thread sizes below ¼ inch (from 0.060 to 0.216 inch, inclusive) are listed as NF threads only, their unification still being under consideration.

The 8-pitch, 12-pitch and 16-pitch threads given in the 1935 standard are listed also in the new one, and extrafine threads (not given in the 1935 edition) have been added. Because of the wide use of the 8-pitch threads (8N), their limits of size are tabulated for classes 2A and 2B, together with those of the coarse and fine series. Limits of size for the extra-fine (NEF), 12-pitch (12N) and 16-pitch (16N) threads are given in the tables for selected diameter-pitch combinations. Some of these combinations also belong to the Unified threads.

## **Groups of Thread Data**

The data in the new standard, consisting of tabulated values and formulas for computing limits of size, may be divided into four groups. The standard recommends that the designer begin by trying, if he can, to use a thread listed in the first group. If none of these threads suits his purpose, he should try the second group, then the third, and finally the fourth. This procedure will reduce computations of thread limits to a minimum and also promote general uniformity of practice in industry.



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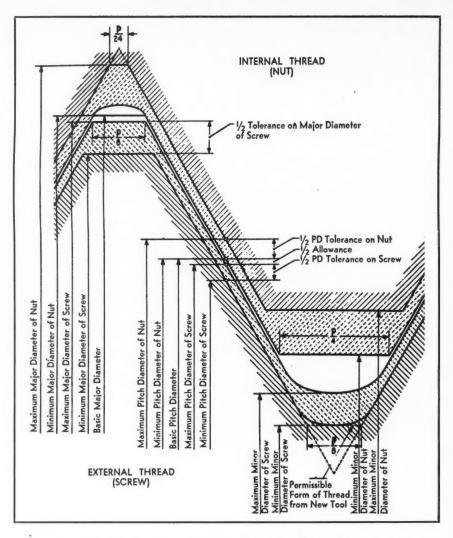


Fig. 3—General character of tolerances, allowances, and crest clearances for Classes 1A, 1B, 2A, and 2B. (Not to scale)

First Data Group. This comprises the coarse (UNC and NC), fine (UNF and NF), and 8-pitch series, for all of which the limits of size are tabulated. For example, in size 1½ inch, the designer has a choice between 1½"-7

UNC; 1\%"-8N and 1\%"-12 UNF. However, in size \% inch, he will find only two "regular" threads, \%"-10 UNC and \%"-16 UNF, because the 8-pitch series does not go below 1 inch.

Second Data Group. This group



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C h ιp gives tables of selected diameter-pitch combinations. For each diameter listed, several pitches are given. For example, in size ¾ inch, the designer will find here seven pitches not listed in the first group. These are: 12, 14, 18, 20, 24, 28, and 32 threads per inch. If neither the coarse 10-pitch nor the fine 16-pitch suit his purpose, he should find out if one of these selected combinations can be used. Complete data for these threads are tabulated, based on a maximum length of engagement of 9 pitches.

Third Data Group. The standard also provides for cases where the designer's problem is still more special and is not covered by the second group. For example, he may need a threaded connection, nominal diameter 0.80 inch, 32-pitch, classes 2A and 2B, length of engagement 9 pitches. No details of an 0.80 inch thread are found in the second group. However, another set of tables provides the following

information for this special thread: pitch diameter allowance, class 2A: 0.0011 inch; pitch diameter tolerances, classes 2A and 2B: 0.0036 and 0.0047 inch, respectively. From these data, the other limits of size may be computed by means of formulas given in an appendix.

Fourth Data Group. In an extreme case, the designer may need a thread, such as a ¾ inch, 80-pitch thread, for which the new standard does not tabulate pitch allowances or tolerances. (The finest ¾ inch thread found in the third group has 64 threads per inch.) All of the limits of size must then be computed for the given class of thread and length of engagement by means of formulas.

#### Stress Area

A new feature in the 1949 standard is the tabulation of the stress area, defined as "the assumed area of an ex-

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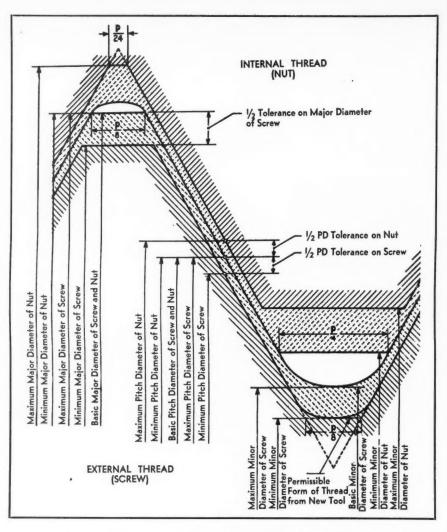


Fig. 4—General character of tolerances and crest clearances for Classes 3A, 3B, 2 nd 2.
(Not to scale)

ternally threaded part which is used for the purpose of computing the tensile strength." For example, the stress area of a ¾"-10 UNC screw is listed as 0.3340 square inch. For threads other than those belonging to the

"regular" series, the stress area may be computed by means of a formula based on the diameter midway between the mean pitch diameter and the mean minor diameter of a class 3 thread.

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#### Credit for Revision

The new American Standard B1.1-1949 was developed by ASA sectional committee B1, on Screw Threads, jointly sponsored by The American Society of Mechanical Engineers and the Society of Automotive Engineers. Officers of committee B1 are: Elmer J. Bryant, Greenfield Tap and Die Corporation, chairman; Frank P. Tisch, Pheoll Manufacturing Company, vicechairman; W. R. Penman, Bethlehem Steel Company, secretary; and R. L. Riley, Bethlehem Steel Company, assistant secretary. Paul J. DesJardins, Pratt and Whitney Division, Niles-Bement-Pond Company, was chairman, and W. H. Gourlie, Sheffield Corporation, was secretary of Subcommittee No. 1 on Revision of the American Standard.

In the discussions of the national aspects of the problem, as well as in conferences with British and Canadian experts, ASA committee B1 cooperated closely with the Interdepartmental Screw Thread Committee of which Dr. Edward U. Condon, National Bureau of Standards, is chairman, and Irvin H. Fullmer, National Bureau of Standards, is secretary.

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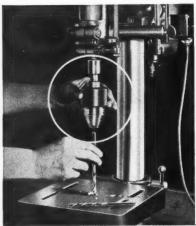
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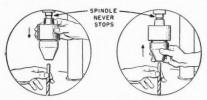
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# An Analysis of Blanking Die Designs, Part II

Important factors which must be considered in the design of compound blanking dies and selection of die sets

By C. W. HINMAN Designing Engineer

In last month's article we followed through the details of how a blank is cut and ejected from the die, and the method of stripping the work material from the punch. Naturally, the next question would be how to determine the blank size accurately, and how to compute the sizes of perforating and blanking punches.

There are two important conditions present in the operation of every blanking die relative to answering these questions. 1. Punch penetration determines the size of the hole cut through the work strip. 2. The die

BLANK

Fig. 1—Blanks of the type illustrated in this drawing require punches that straddle the slot in the blank.

opening determines the size of the cut blank. Therefore, the punch determines the size of a perforated hole, and the die opening determines the size of the cut blank. Obviously, punch clearance is added to the die opening when perforating holes, but it is subtracted from the punch size when cutting blanks. In other words: The punch establishes the size of a hole perforated in the strip, and the die establishes the size of blank wanted. These conditions should be held firmly in mind when designing dies for perforating or blanking.

The only deviation from this rule is found in the performance of precision work. In that case the over-all size of the perforating punch is made 0.002 inch larger than the size wanted, and that of the blanking die is made 0.002 inch smaller than the blank wanted. This is not changing the rule, nor is it a fault of the rule; it is necessitated by the contraction and expansion in the finished blank. A perforated hole shrinks, and a blank expands practically 0.002 inch after being cut. Expansion of blanks is largely the result of the size, thickness, and material of the blank. Large thin sheet metal blanks cannot be replaced in the die that blanked them, without consider-

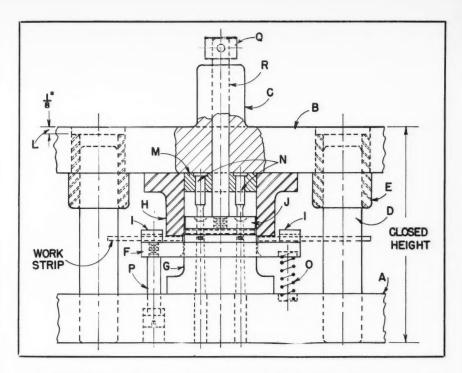


Fig 2—Drawing showing design for a compound blanking and perforating die.

able fitting and hammering.

An example of these changes appears when computing sizes for perforating and blanking a round washer from 1/16 inch gauge hard-rolled steel. The desired washer has an outside diameter of 1.000 inch, and a center hole of 0.500 inch diameter. From our last article, the over-all punch clearance for hard-rolled steel is 7 per cent of the stock thickness, or 0.07 of 0.0625 inch which equals 0.0044 inch. The blanking die opening is therefore 0.998 inch and its punch is 0.9936 inch diameter; and the perforating punch is 0.502 inch diameter, and its die opening is 0.5064 inch diameter. For precision work, testing samples of the metal in another die will settle the question of expansion and contraction.

It is not difficult to find cases where blank sizes are established by the punch. One such case occurs when the punch has opposite cutting edges that straddle a slot in a blank, as shown across the width A in Fig. 1. Here, the punch actually establishes the cut width of A in the blank. Therefore, the width between cutting edges, each side of the slot in the punch, must be the same as width A, and punch clearance is subtracted from the supporting tongue or projection in the die. On the other hand, for projection B from the blank, the die establishes the width of B, and punch clearance is subtracted from the corresponding projection on the punch. In this and other similar cases, the punch functions as a die locally across the width of A, and for B handling the punch clearance is the

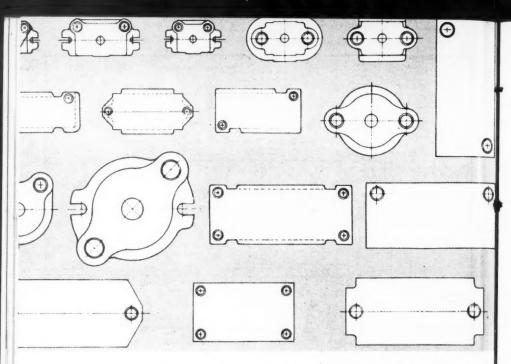


Fig. 3—Illustration showing plan views of commonly used die sets.

same as given in the rule. Our attention is directed to the fact that in some designs of blanking and cutting dies, the punch and die functions become so intermingled that a designer who does precision work, must use careful thought in order to analyze and to understand his job correctly.

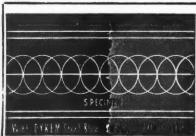
# Designing Compound Blanking Dies

Figure 2 shows a design for a compound blanking and perforating die.

This type of die is of the inverted type. Blanking punch G is attached on die shoe A, and blanking die H is aligned over it, attached on punch holder B.

For perforating holes combined with blanking, inverting the positions of the cutting members has four advantages:

1. Accurate work; 2. Perforating and blanking is performed in one press stroke and at one station, thus reducing the die size; 3. The blank is delivered from the die on the up-stroke



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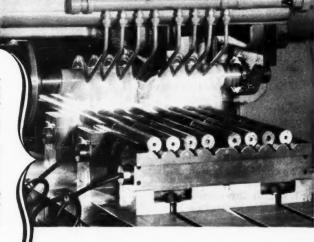
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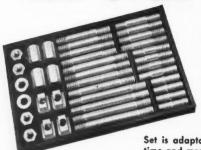
and above the work strip; and 4. All the slugs from perforated holes are delivered down through the blanking punch and the die shoe, and then out beneath the press. Slugs are thus segregated from the blanks. These features are desirable because they favor rapid operation of the tool and tend to give the user trouble-free operation. Compound perforating and blanking dies are built for accurate work. The positions of perforated holes are in their desired relationship to each other and to the blank contour. However, like all other tools, their great accuracy depends upon the precision that is built into them by the diemaker. No tool can exceed the operating functions built into it.

The compound action of perforating and blanking is clearly shown in Fig. 2. Here, in the closed height of the tool, piercing punches N are shown pushing slugs out through the blank-

ing punch, which acts as a die for the two piercing punches. The cut blank itself lies on the face of blanking punch G, which has cut the blank up into die block H, attached on the punch holder.

The blank and both its holes are accurately cut in this single station, and with little or no punch or die clear-The resulting workpiece is ances. practically a shaved blank, both within its two holes and its blank contour. This type of press tool can be used advantageously in producing perforated blanks from brittle materials, such as hard fiber, Presdwood, and ebonite. Pressure of spring-pad F contacts the work strip between itself and die H before cutting begins, and holds it perfectly flat while perforating and blanking. This feature eliminates checks and fractures which are common faults if attempting to blank brittle materials in plain dies.

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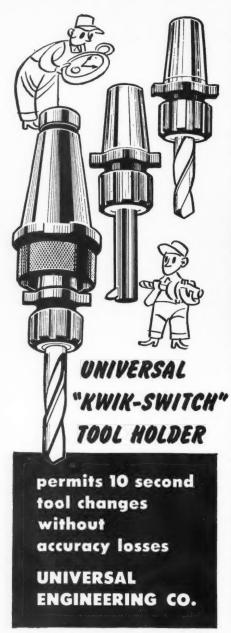
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## **How Compound Dies Operate**

As the die approaches its closed height, punch G cuts the blank up into die H, and against ejector pad J, which is attached to vertical rod R. The cut blank is carried up within the die, and is ejected when rod R contacts the knockout bar in the press head which depresses the rod and pushes out the blank.

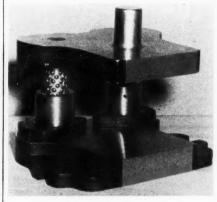
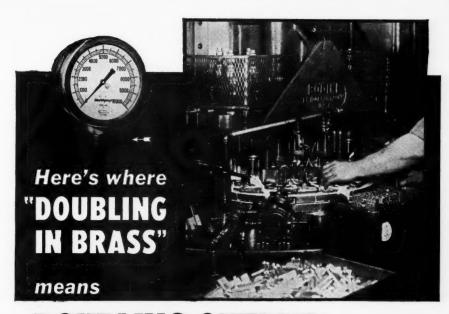


Fig. 4—Illustration showing die set with round guide posts equipped with ball bearings.

When the press ram ascends, stripper-pad **F** follows up under the strip because of several compression springs **O** beneath it, and this action lifts the cut strip from blanking punch **G**. The face of stripper-pad **F** in ascent, stops flush with the surface of punch **G**. The heads on stripper screws **P** stop the pad at its desired height, so that the work strip can be advanced without interferences.

Other features in this tool are: work strip guides I, punch plate M, oil pockets L, and ejector block Q, which is pinned at the top on rod R. The purpose of the ejector block is to prevent the rod from falling out, and to protect the ejecting mechanism if the press is accidentally operated when the ejector bar is set too low, while setting up the



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job. The block prevents smashing the rod and its attached mechanism in the die. Some ejector mechanisms are more delicate and complicated than the one shown here, and ejector block **Q** is frequently the means of avoiding the removal of the die to the tool room for repairs, while the job and press stand idle.

This compound die is of simple design in order to present the principles of its design and operations. In actual pressroom practice, a compound die may be further complicated by having an irregular blank contour, and several sizes and shapes of holes.

## Selecting the Die Set

Figure 3 shows the plan views of commonly used die sets. The types used most are the three shown in the upper left-hand line. For blanking and perforating large heavy gauge sheets, the four post sets in the third and fourth lines are selected. Four post sets prevent punch deflection and ensure that the cutting members enter one another without shearing or nicking their edges. They provide that the punches enter the dies with full benefit of their clearances being evenly distributed, as designed and intended, around each punch and die.

Sizes of die sets are those that might be held on the palm of your hand, up to those 50 by 100 inches for rectangular four post sets that weigh over 7,500 pounds. And there are scores of other sizes in between. Punch holders and die shoes are furnished by the supplier in many thicknesses to suit all types of die designs. The other sets shewn, but not described, are used for various die designs such as, drawing, forming, or forging. The long narrow die sets are intended for progressive dies.

It is a good idea to let the die set manufacturer bore and finish all the openings needed in the upper and lower members, before he assembles the set. Nicholsen carteon-type advertisements have helped to make "Nicholson" the best known file brand in America. They've been appearing for years in The Saturd'v Eve-1-s Post.

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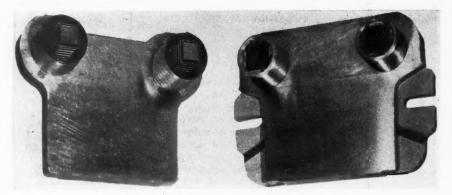
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Fi. 5—Illustration showing die set with square guide posts equipped with roller bearings.

This can often be done by using an acetylene torch for burning out irregular openings, roughly, to suit die engineer's sketches. This procedure avoids warping the die set, if the openings are cut after the guide posts and bushings have been assembled in the set.

## **Recent Improvements in Die Sets**

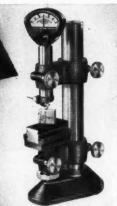
We should say a word here about the E. A. Baumbach demountable die sets which are much in evidence lately. All these die sets have demountable guide posts and bushings. This exclu-



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sive feature permits removing the guide posts for doing machine work on the die shoe, and ensures reassembly without loss of alignment. When grinding dies for resharpening, the guide posts, which are always an interference, can be removed and then replaced after grinding.

These die sets have patented flanges at the bottoms of the guide posts and bushings. The flanges secure the posts and bushings by using screws and dowel pins inserted through them and into the die set members. This idea makes it easy for any shop to build its own die sets. All that is necessary is to obtain the assembled guide posts and bushings, and install them in any size or shape of special punch holder and die shoe needed. Nonstandard die sets are often needed for mounting unusual designs of punches and dies. Even the punch shank is demountable, being threaded and screwed in place. Cast iron or semisteel shoes and

holders can be secured locally, thus saving considerable transporation charges, usually paid on complete sets.

Ordinary commercial die sets use round guide posts that are sliding fits in the guide bushings. It is common practice when separating these sets to employ a "hitch along movement" from one post to the other, to separate the upper and lower dies for regrinding the cutting members and other repairs. Usually this cannot be done without persistent hammering or using special screw-jacks or hand pinch bars for dismantling the set.

A new type of die set is now available that removes these difficulties. Some of these sets have round guide posts, and others square posts. The principle consists in using a series of ball bearings for the round post sets, and roller bearings on four sides of the square post designs. Figures 4 and 5 illustrate the idea. These sets are available in all the types shown in Fig.



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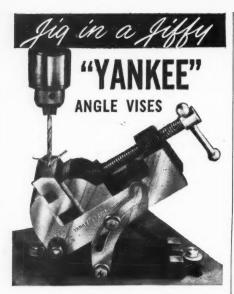
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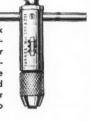


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3. This invention has made it possible to lift the punch holder from the guide posts by hand. In heavy four post sets, the punch holder can be removed just as easily by using a light hoist.

Our next article in MODERN MA-CHINE SHOP will illustrate and describe several types and designs for large perforating and blanking dies.

Siewek Jigs, Fixtures, and Clamps. The Siewek Tool Co., 2862 E. Grand Blvd., Detroit 2, Mich., has issued a 150-page catalog presenting the results of 40 years of progress in the standardization of drill jigs, fixture clamps and fixture details. Covered are 6 styles and 84 sizes of spring jigs, 7 styles and 77 sizes of rack and pinion jigs, 14 styles and 73 sizes of rapid clamps, 15 styles and 156 sizes of fixture details, and 9 sizes of fixture racks.

The catalog is divided into five sections by colored separators, and the company name is stamped on the backbone which is part of the plastic ring bindery. Further convenience is provided by the generous 9 x 12-inch page size of the catalog, copy of which is available to mechanical executives requesting Catalog No. 7 on their company letterheads.





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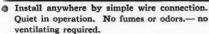
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### Cylinder Machining Time Cut More Than Half

### L & N Time Study on Machining Job Reveals Unusual Saving

By ROBERT F. STUCKER and RAYMOND FOGARTY

A LTHOUGH the majority of machine tools on the market today are designed primarily to perform only one specific operation, worthy of note is the significant trend toward the development of more and more machines which will individually perform a variety of operations. Experience has shown that on many types of workpieces a considerable amount of time may be saved in setting up work on one machine rather than to transfer it from one tool to another to be machined. This is especially true when the workpieces are of large size.

The machining of locomotive cylinders in the South Louisville terminal shops of the Louisville & Nashville Railroad provides an excellent example of the savings in both set-up and machining time that are possible when a single machine is employed to perform a variety of operations. Previously, locomotive cylinders were transferred successively from one tool to another for boring, planing, drilling and tapping. Now the operations are performed on the Giddings & Lewis horizontal boring, milling and drilling machine shown in Fig. 1. After L & N made a close check upon the machining and set-up time involved, the results were tabulated as shown in Table 1. This tabulation clearly shows that machining and set-up time was reduced from a previous 84 hours to the present 36 hours and 45 minutes.

A detailed summary of the operations in each work setup is also shown in Table 1. The results are due to a combination of the machine's features and the originality exercised by L & N forces, not only in tooling for this jcb but also in reducing the number of times the cylinder has to be handled to complete the operations.

The complete set-up time required in the first work position for milling, facing, boring, backboring and milling the exhaust cavity is approximately one hour and a half. The actual time study on the same job, before new machining methods were adopted, showed that it required two hours merely to place the cylinder on a boring machine and make the necessary center alignments for the cylinder and valve openings. This did not, of course, include the time taken to remove the work from the cylinder boring machine and then set it up on a planer for subsequent operations. Thus, boring and planing the cylinder on two machines required approximately 66 hours as compared to 221/2 hours on the horizontal boring machine.

Carbide cutting tools are used exclusively, with the exception of the straddle milling cutters employed to contour mill the boiler seat and one Fig. 1—The locomotive cylinder shown here can be posiioned for various boring, facing, milling, drilling and tapping operations merely by indexing the table.

spiral mill for a single facing operation. To rough and finish the cylinder barrel four cutting tools are used on a simple arm type boring head. After the work is completed. the boring head is removed from the line bar and the latter is centered in the valve barrel. Correct center distances are established with machine scales and verniers. Cutters are then placed in the bar, and three surfaces in one side of the valve

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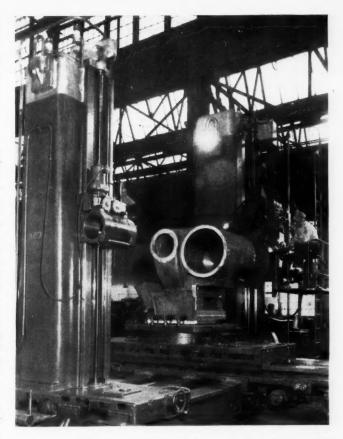
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barrel bored. In the same work setting, and by transposing the cutters, the three opposite surfaces of the valve barrel are backbored. Carbide cutters which are used when milling the frame fit not only remove metal faster but also produce a better finish.

Cylinder and valve barrel facing operations, as shown in Fig. 2, are performed with a continuous feed facing head. After one side is completed the casting is rotated 180 degrees, through the use of a precision rotating table presenting the opposite side for facing.

An interesting innovation has been made in machining the boiler saddle



contour of the cylinder half, with straddle mills mounted on an arbor type line bar, and spaced to clear the exhaust steam passage. Ordinarily, only a single cut is required to produce the finish desired for the boiler fit. However, it is necessary to make three passes with the cutter to machine the complete saddle contour surface. Although spacing of the cutters permits adequate clearance, either the table or spindle feed must be engaged to position the work or cutter. The saddle contour is determined by a duplicating attachment controlled from a steel template.

#### Table 1

### Sequence of Operations and Machine Time

I Setup and layout.

Operator depends entirely upon machine scales and vernier scales to establish dimensions.

2 Rough face cylinder barrel, valve face

and frame toe fit.

3 Rotate 180 degrees—perform same operations on the opposite side. Total 6 different facing cuts. Operations 1-2-3—Time 3 hrs. 20 min.

4 Rough and finish cylinder bore.

Operation 4 — Time 3 hrs. 40 min.

5 Move boring bar from center of cylinder to valve center. Table and headstock scales and verniers used for this setting.

6 Rough and finish bore three surfaces

-(step cuts).

- 7 Back bore opposite side of valve.
  Operations 5-6-7—Time 4 hrs. 40 min.
- 8 Finish face valve cylinder barrel. Facing operations on cylinder and valve barrels performed with a continuous feed facing head.

9 Form the joints.

Operations 8-9—Time 3 hrs. 15 min. 10 Rotate 90 degrees and face frame seat with H.S.S. spiral mill.

Operation 10—Time 5 hrs. 20 min. 11 Rotate 180 degrees and face exhaust cavity and undercut for exhaust stand studs.

> Operation 11—Time 1 hr. 20 min. Total Machining Time—20 hrs. 55

Floor-to-Floor time 1st setup—22 hrs. 25 min.

#### Second Work Setup

1 Place cylinder on box type fixture.

2 Face mill cylinder splice.

3 Mount straddle mills on arbor and set up duplicator attachment to mill boiler saddle contour on one cylinder.

4 Mill saddle contour.

Operations 1-2-3-4
Floor-to-floor time—14 hrs. 20 min.
OVERALL MACHINING AND SETUP
TIME..36 hrs. 45 min.
FORMER MACHINING METHOD

OVERALL TIME—84 hrs. Analysis of Cylinder Castings: 3 per cent carbon, 88 per cent manganese, 1 per cent silicon, 0.35 per cent phosphorous, 1.25 per

cent nickel.

In order to attain the time shown for the various work settings and machining operations, it is necessary to take full advantage of tooling, holding fixtures, machine attachments and machine movements. A Detroit-Universal Company Duplicator on the machine makes it possible to perform all types of contour milling operations from a steel template. It is customary when machining the boiler saddle contour to bolt or clamp two cylinder halves together and then machine them simultaneously. However, when there are no pairs of cylinders to be machined in this manner, it is still practicable to contour mill the cylinder half.

Another factor which contributes to the reduction of overall production time is the ability of the machine to handle complex work, without interference or repeated work settings, through three individually-controlled power feed movements, namely, longitudinal and lateral table traverse, and vertical headstock travel. A fourth, or rotative movement, is obtained by the manual operation of a rotary table, which is a standard machine attachment.

Power feed movements may be engaged separately or in combination. When so used, difficult machining work is greatly simplified and production time is decreased.

On this particular machining job the cylinder can be positioned for various boring, facing, milling, drilling and tapping operations merely by indexing the table. By noting the operations performed in the first work setup the advantages of this can be seen. By moving the table, irregular contours, angular bosses, pads, flanges and flats may be quickly presented to the cutting tool without resorting to elaborate settings of the work.

Finally, time-consuming work setup for different machining operations on other machines (such as boring, milling, backfacing, counterboring, drilling, reaming and tapping) are eliminated. Furthermore, there is little chance of cumulative error entering into the different operations as the result of clamping, unclamping and mov-

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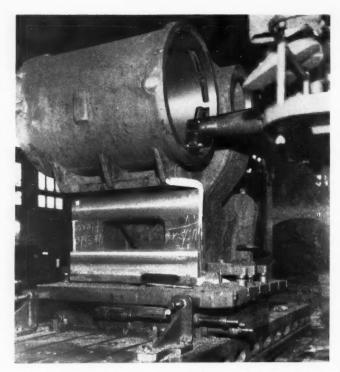


Fig. 2—Cylinder and valve barrel facing operations are performed with a continuous feed facing head.

other jobs commonly found in terminal shops, back-shops and the engine house.

Graham Multi-Purpose Machine Vises. Bulletin No. 44 released by The Graham Mfg. Co., 130 Bridge St., East Greenwich, R. I., describes two new vises, as well as the company's standard vise, and the Graham knurl holder. The new vises are a swivel-base unit featuring an adjustable zero pointer, and a centering

vise in which both jaws are actuated uniformly toward the center by a left-and-right-hand screw so as to center work of varying diameters. The standard and swivel vises described are of multi-purpose design, capable of being equipped with special vee or shell jaws and with various jig attachments such as stops, guides, drill bushings, and so on. Copy of Bulletin No. 44 free upon request.

ing the work, and overall machining accuracy is greatly improved.

As has already been made apparent, the machine is well-suited to many other types of railroad work, including the machining of steam pipes, cross heads, valve gear, booster engines, links, rods, track frames and many



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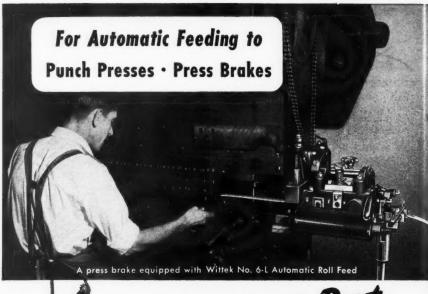
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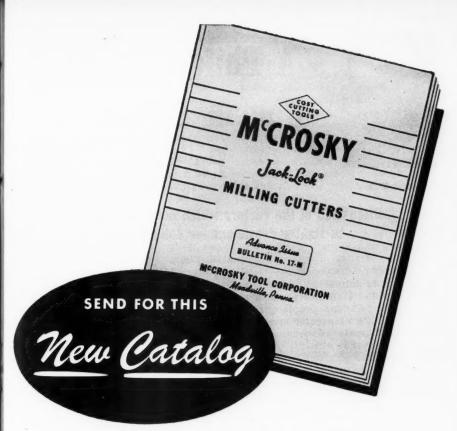
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Dillard E. Bird

### A Philosophy of Human Relations, Part V

### A Discussion of the Factors which must be Considered in Making Provisions for Job Security

By DILLARD E. BIRD

AM quite interested in employee security and I am not alone in my interest. In fact, few people question the desirability of greater security. I believe that greater economic security for employees is an absolute necessity. I am going to attempt to do three things: first, to point out some of the more important reasons why management must provide greater employee security; second, to bring to light the fallacies in some of the methods which have been suggested for achieving greater security: and third, to set forth what seems to me to be the one best way by which the goal of greater security can be attained.

The factors which establish the necessity for employee security fall into three general classifications: the economic factors, the human factors, and the socio-political factors.

Economic Factors. From the standpoint of economics, steady jobs are essential. Our whole economic system has been keyed to a high level of production. However, high production cannot long continue without high consumption. High consumption depends upon high wages. And yet, high wages alone are not enough. They must be continuing high wages—the income from steady jobs. The minimum level of consumption resulting from widespread unemployment cannot provide the necessary market for the production of our economy. Steady jobs and high wages lead to security for workers, more regular operations and profits for business, and a more complete realization of the full benefits of our economic system.

Human Factors. The human factors in favor of greater security are of an importance equal to that of the economic factors. Workers are motivated by fundamental human desires and drives. Men work to obtain the money to provide for the satisfaction of their basic needs and wants. Men work in order that they may share to the greatest possible extent in the things they help to produce. Men work to gain the recognition of their fellows.

Lay-offs, unemployment compensation, and the dole are anomalous to the healthy normal desires of men. Workers seldom have more than a bare subsistence during lay-offs. They are unable to share to any great extent in the variety of goods and services capable of being produced by our economy. The

nemployed worker is deprived of any sense of recognition, achievement, and self-respect.

Socio - Political Factors. The economic and human factors cited warrant the intensive study by management of the problem of irregular employment. However, the socio-political factors are even more significant than the other two.

The laid-off worker finds his desires blocked. His income is cut. His plane of living is lowered. His savings are depleted. His self-respect is annihilated. He feels insecure. He comes to condemn himself for being unable to get and hold a job. He condemns his employer for laying him off. He condemns the private enterprise capitalistic system, represented to him by his employer, for its instability.

An individual, finding himself in such a position, is quick to accept anything which will apparently give him what he lacks. The disgruntled man is more often ruled by emotion than by logic. He will shift his allegiance from a system presenting certain problems to a system apparently presenting solutions to those problems. He seldom considers the flaws in the system to which he is shifting. Proponents of change capitalize on this human tendency. They compare the weaknesses of the existing system with the strong points of the proposed system. They never mention the strengths of the present system nor the flaws of the system which is proposed.

The entire course of human history is marked by changes in the forms of government and in economic systems. Earliest men had no government. As they progressed and attempted to improve their situation, they adopted more and more government and more economic controls. Weaknesses became apparent in absolute governmental and economic controls. Men sought solutions for these weaknesses and, in

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so doing, gradually cast off controls and assumed more freedom. Then, in attempting to correct the faults of a comparatively free system, they gradually re-adopted more controls. The shift has always been from extensive controls to comparative freedom and back to extensive controls, an evolutionary cycle.

The history of this country gives evidence of a trend toward governmental regulation. An extensive bureaucracy has grown over the years.

We have reached the point where we must now decide either to reconcile ouselves to even more complete controls with the consequent loss of freedom or to develop solutions to the difficulties of our private enterprise system which will permit the retention of our present freedom.

The two principal problems posed by the private enterprise system in America todayare: (1) unemployment, and (2) irregular earnings. It is the responsibility of business to provide answers to these problems. It we want to preserve our system and its many values, employment security must be provided.

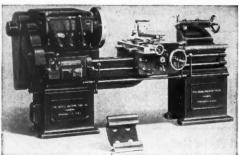
The widely discussed idea of "The Guaranteed Annual Wage" has been proposed as the answer to the prob-

lem of employee insecurity.

The term "Guaranteed Annual Wage" merits critical analysis. Few terms so extensively used have so many connotations. It has no standard definition. "Guaranteed Annual Wage" is, in itself, a misnomer. No employer, under our economic system, can give an absolute guarantee to his workers. Not all existing guarantee plans are annual. Assurances are given for periods varying from a few months to an unlimited length of time. Not all guarantees currently in effect are for wages. Some are for hours or weeks of work and some are for wages. Few plans now in existence guarantee a

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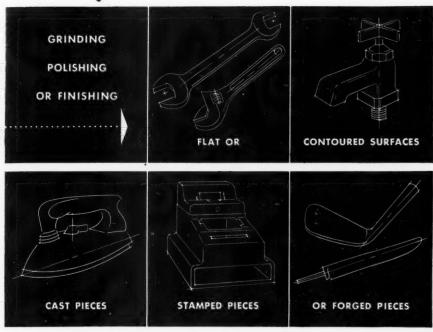
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workman a sum equal to 52 weeks times 40 hours at his established hourly rate. Thus, "The Guaranteed Annual Wage" is not a guarantee, not necessarily annual, not essentially for wages.

In contemplating the guarantee of work or wages, there are many difficulties which become apparent. A constant level of operations is prerequisite to the offering of a guarantee and essential to the continuation of the plan. The difficulties of attaining and maintaining a constant level of operations vary directly with the effects of economic conditions on the company, the rapidity of technological progress in the industry, and the types and characteristics of the particular products of the firm. The effects of each of these variables will be considered separately.

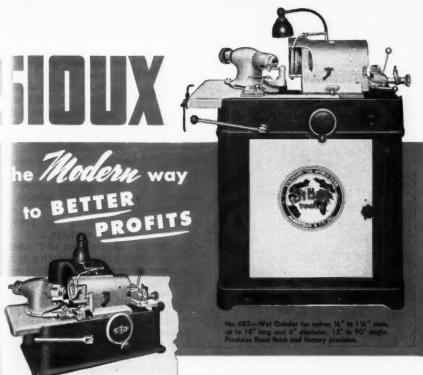
### Effects of Economic Conditions on the Company

There are three principal economic conditions, the effects of which are severe in many companies; seasonality, cyclical fluctuations, and the secular trend.

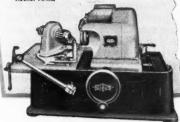
Certain industries can produce only at certain seasons of the year. Others have a highly seasonal demand for their production. Some face both problems. Companies in these industries may have difficulty in attaining "yearround" regularized employment for their workers.

Some businesses suffer wide cyclical fluctuations. These businesses are able to offer all of their workers steady employment this year and next but may find it difficult to keep even a few workers employed during a depression.

The long term or secular trend in a given industry or company is important. Employees may be more easily assured of regular employment in an expanding business. The company whose business is decreasing will necessarily decrease the size of its work force accordingly, so long as it continues in the same line of business.



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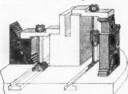
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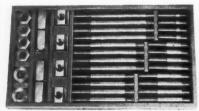
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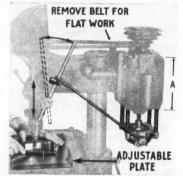
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**Technological Progress** 

The second major variable in determining the difficulty of attaining a constant level of operations is the rapidity of technological progress in the industry. Innovations and inventions which alter the product, replace it entirely, or change the method of manufacture, lead to more effective production and result in the production of more, better and less costly goods and services. However, these changes frequently result in the displacement of workers. It is often difficult to find other jobs for displaced employees. The employer in an industry subject to rapid technological changes has a real problem in attempting to provide steady jobs for his workers.

Types and Characteristics of Products
The types and characteristics of the
particular products of the firm constitute the third major variable to be
considered in determining the difficulty of attaining a constant level of
operations.

Types of Products. The products of a firm may have great bearing on its efforts to regularize production. Let me sketch for you the primary effects on the company of the products which it produces, classified according to their general economic utility.

1. Consumers' Non-Durable Goods. The producers of consumers' non-durable goods in many cases can provide steady work rather easily. Seasonality is often such a producer's greatest problem. Sometimes demand may not be sufficient to utilize the production of a full work force. However, in such cases, the manufacturer is usually able to produce to stock within certain limitations.

2. Consumers' Durable Goods. The producers of consumers' durable goods are likely to experience somewhat more difficulty in regularizing operations and employment. The purchase of durable goods can be and often is postponed. The demand for such goods



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may be not only seasonal but also subject to wide cyclical fluctuations.

- 3. Producers' Non-Durable Goods. Some firms engaged in the production of producers' non-durable goods find it very difficult to achieve regularity of operations and employment. The demand for these products is dependent upon the activity in other lines of business.
- 4. Producers' Durable Goods. The manufacturers of producers' durable goods usually have the most difficulty in regularizing operations and employment. The companies in these industries usually experience little seasonality. However, the postponability of purchase characterizing the demand for their products results in extremely wide cyclical swings in the level of operations and employment.
- 5. Service Businesses. Employers in service businesses engaged in serving either producers or consumers often can do little to regularize the demand

for the services offered. They must be ready to render service when and where needed. All of the ingenuity of management is necessary to provide a constant level of employment for workers in service businesses.

#### Characteristics of the Particular Product

Products have a great effect on the efforts to regularize production and employment in another way. While manufacture to stock, to allow regular production despite irregular demand, may be feasible from every other point of view, the characteristics of the particular products themselves may prohibit or seriously limit the use of this device. For example:

The storage of very expensive products requires excessive capital investment in finished goods inventories.

The expense of storage of bulky low cost products may add unduly to the cost of the product.





Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

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Extreme risk is incurred in the storage of products subject to frequent style changes.

Products subject to deterioration either cannot be stored or need special warehousing facilities to store them with safety. This adds to the cost of the products.

Extremely large or heavy products often prohibit economical storage.

The effects of economic conditions, the technological progress in the industry, and the types and characteristics of products in each individual situation will have to be carefully studied and a solution found to the problems which they present before a regular level of operations and employment can be achieved and a guarantee considered.

One group of the proponents of guarantees apparently ignores these difficulties in achieving a regular level of operations and suggests that all employers be required to guarantee work

and wages to their employees as a means of attaining greater job security. Few employers have solved all the problems confronting them in their attempts to provide complete employment security for all of their employees. Employers could be required to guarantee work and wages only if sales were guaranteed. Employers, being compelled to guarantee, could not be expected to assume the risks involved in a possible shortage of the factors of production. Each employer would have to be guaranteed adequate labor, materials, supplies, machines, equipment, and financing, as well as a market for his products.

The nation-wide system of guarantees, proposed to give workers more security and thus solve the major problems of our economic system, would, in effect, overthrow private enterprise and result in regimentation in a rigidly controlled economy. A system of guarantees would mean:



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For specifications, plus information on other Challenge equipment for the tool and machine industries, write today.

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- Purchasing and procurement activities would be directed;
- The production of goods and services and the manner of producing them would be specified;
- Sales activities and prices would be regulated;
- Employment would be strictly controlled:
- 5. Wages would be fixed; and
- Financing would be government supplied or controlled.

Workers would thus have employment security at the sacrifice of all else.

Workers and the public in general must be convinced of the advantages of our individual enterprise system if the adoption of some such scheme as compulsory guarantees, to provide security at any cost, is to avoided. The confidence of the individual employee in his employer is prerequisite to his belief in our individual enterprise system. After all, his employer represents

the system to the worker. The lack of confidence of a worker in his employer is usually concomitant with his lack of confidence in the economic system.

It is the responsibility of management to convince workers and the public of the desirability of the continuation of our individual enterprise system. Managements' efforts must show progress in the solution of the problem of insecurity.

A suggestion by another group of the proponents of guarantees has been heralded as the means to this end. They say that individual companies should voluntarily guarantee work or wages to their employees. Such voluntary guarantees usually take the form of a written commitment given by an employer to specified groups or all of his employees, assuring them of a minimum number of hours or weeks of work or wages over some extended period of time.

There are some outstanding examples of companies offering voluntary



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How to show
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out an old machine is expensive

Of course, you know that an obsolete machine, even with its low carrying charges, usually costs more to run than a new one. Your treasurer probably knows that, too; but it won't hurt to remind him that the best time to replace old machines is before they are completely amortized on the books. For, an automatic five years old is dangerously below today's Acme-Gridley production standards.

If you have seen new Acme-Gridley Automatics in action, you know that doubled production is not uncommon. Maybe we could help you prove this point for your treasurer—by placing in your hands more case histories of the actual experiences of some of our customers—down-to-earth records of dollars saved with new Acme-Gridley Automatics. Here's a typical example:

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MACHINE—2" RB-6 Spindle Acme-Gridley Automatic

PART TURNED-Steel Eccentric Bushing

 $\textbf{MACHINING TIME} \color{red} -17\frac{1}{2} seconds \color{black} -for~15 operations$ 

FORMER METHOD—Blank out on automatic, then, on second machine, finish eccentric shoulders, internal recess and gouge O.D.

PRODUCTION INCREASE-300%



ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

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guarantees. Procter and Gamble has guaranteed forty-eight weeks of regular employment to large numbers of employees for nearly twenty-five years. Hormel, starting in one department, gradually evolved a guarantee plan covering most of the employees in the plant at Austin, Minnesota. Nunn-Bush guarantees wages to employees in an amount equal to a percentage of the total value of production. Management, of its own accord, has provided more security to workers in each case by providing steadier operations and employment.

The outstanding success of these three and other plans should not lead us to the conclusion that the task of providing steady operations and employment is simple; neither should the difficulties of less successful plans lead us to the conclusion that the task is impossible.

The many problems to be solved by a company before offering a guarantee were pointed out above. The picture often looks black to the employer contemplating efforts to regularize operations. The Latimer Report, entitled Guaranteed Wages, which was presented to President Truman in 1947 by a research committee of the Office of War Mobilization and Reconversion, concluded that employers can do little or nothing to provide a more constant level of operations and employment. This conclusion is unjustified. Employers in too many industries and facing too many difficult problems have overcome these difficulties and offer steady employment to their workers. It is not easy to regularize operations and employment but it can be done.

Next month we will offer the methods which management may employ and the essential features of a good program of employment stabilization, stating our final conclusions concerning guarantees and stabilization and the most effective plan which

management can follow.



# Lathe Bed Ways Hardened by Induction Heating

### Localized Heat Pattern Provided by High Frequency Induction Hardening Method Widens Range of Application

By FRED W. VOGEL

FOR hardening the ways of lathe beds, the high frequency induction hardening method offers many advantages of which perhaps the most important is the saving in time which is made possible through the application of the process directly to ways that are cast as an integral part of the bed. In actual practice, the Hendey Machine Company of Torrington, Connecticut, is at the present time employing the induction hardening process on both precision and production lathe bed ways ranging in sizes up to 16 feet in length.

It is particularly significant that the maximum amount of distortion encountered in hardening the ways of a 6-foot lathe bed by this method is only 0.012 inch. With the distortion held to a minimum, the ways can be machined more closely to the finish dimensions before hardening, with the result that less machining time is required after hardening.

The basic principle of the process of induction heating as applied to the hardening of the lathe bed ways is essentially the same as that employed in the hardening of parts such as crankshafts, gears, cams, and so on, the difference being largely one of size of equipment required to process the work. The work is placed near a coil

through which an alternating current is passed. An electromagnetic field is present around the coil as long as current is passing through the coil. A piece of work placed in the path of this electromagnetic field creates a resistance to the field and thus causes heat to be generated within the work-piece.

Prior to hardening the ways, the Hendey lathe bed castings are rough-planed, after which they are stored for a period of time to "season" and reduce casting strains to a minimum. A second planing operation follows in which stock is removed to within 0.020 to 0.025 inch of the finished size. This excess stock is later removed by grinding. Holes which will be used later in bolting the legs to the bed are then drilled and the bed is ready for hardening.

The equipment which makes it possible to case harden the ways of Hendey lathes to depths of from 0.093 to 0.125 inch consists of the 50-K.W. General Electric electronic heater shown in Fig. 1. This heater is equipped with a special locating table on which the beds are positioned during hardening. Accurate positioning of the parts on the heater table is important for the reason that an equal amount of space between the coils of the heat-

h

er and the ways must be maintained throughout the heating cycle.

As shown in the close-up view of the heating coil head Fig. 2, a set of guide collers attached to the floating coil head rides on the ways to hold the coils in proper alignment above the

Surface heating is generally accomplished with currents with frequencies ranging from 200,000 to 500,000 cycles per second. Heat may be conducted from the initial depths of penetration to greater depths if the heating time is long enough and if sufficient gen-

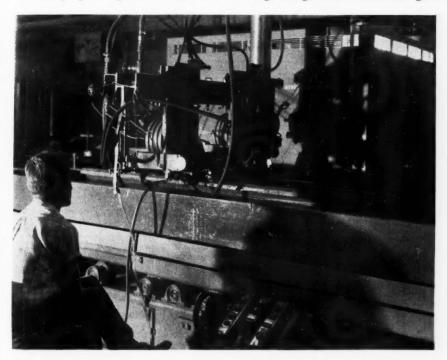


Fig. 1—Hendey lathe bed mounted on special locating table of General Electric 50-K.W. high frequency induction heater.

ways. The heating coils are shaped to fit the contour of the ways in order to ensure uniform depth of heat penetration without overheating small cross-sectional areas. Depth of heat penetration is primarily dependent upon the current frequency and the power output of the generating equipment. The higher the frequency of the heating coil current, the greater is its tendency to follow the contour of the bed that is in proximity to the coil.

erating power is available.

The table drive is operated by an electronic control system known as a Thy-Mo-Trol which enables the table to be moved without interruption and at a constant rate of travel ranging from 0 to 30 inches per minute. The Thy-Mo-Trol unit is generally set to drive the table at the rate of from two to five inches per minute, depending upon the section being heated. Care is taken that the ways are heated the

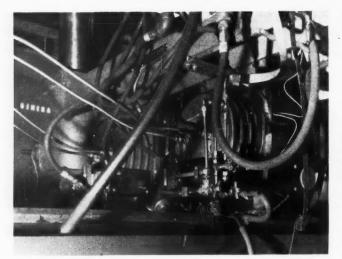


Fig. 2-The specially designed heating coil head is equipped with a set of guide rollers which rides on the

Since quenching of the work after heating is a particularly important factor in the successful hardening of the ways, specially designed quench heads have been developed which di-

rect a spray of water to the exact location on the work where the heat is applied. In order to aid the operator in controlling the direction and location

exact amount of time necessary to obtain the required hardness, which on the Hendey lathe bed ways is approximately 500 Brinell.





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9.327 - This POPE Sealed Motorized Spindle is recommended for all makes of ommended for all makes of "x 18" surface grinders. 6" x 18" surface grinders. 18" motor than 8 sealed lubrication, SK and sealed lubrication, SK super-precision, double row super-precision, double so roler insiates and greater production. production.



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of the water spray, the quench head is also provided with an outlet for a jet of air which assists in focusing the and pan are then bolted to the finishplaned base, after which the bases are transferred to a Thompson hydraulic

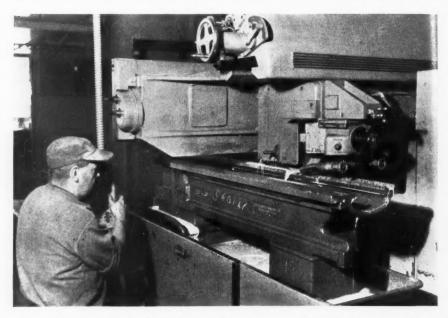


Fig. 3—Grinding ways of Hendey lathe on Thompson heavy-duty hydraulic way grinder.

water spray between the hot section of the ways and the cool section. After hardening, the lathe beds are conveyed by means of an overhead crane to a planer where all surfaces except the hardened ways are finish-planed. Legs way grinder, a close-up view of which is shown in Fig 3. This grinder is equipped with an auxiliary vertical spindle for grinding the safety gib, clamp surfaces, and rack seats on the machine bed. Lathe bed ways are

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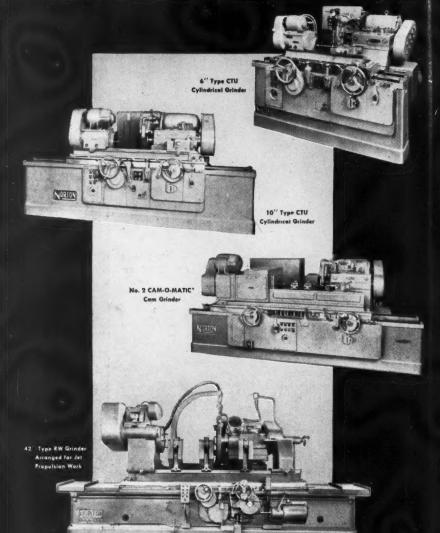
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# Practical Pointers on Steel Treating Part V

W. R. Bennett

# A Discussion of Quenching, Hardening Carbon Steel Milling Cutters, and Heating and Quenching Hot Forge Drop Dies

By W. R. BENNETT

W HEN we heat a piece of steel for hardening, we heat from the outside to the center because there is no alternative. When we quench it, we quench from the outside because of the same reason. When we heat a hardened piece for the purpose of drawing the temper, we also heat it from the outside not because we are forced to do so, but because it appears to be the universal procedure.

The question arises, "Why should it be necessary to draw the temper?" The answer is: To relieve internal strains set up in quenching and also to relieve the brittleness. If we heed instructions, we must not place a cold hardened piece in a hot fire or tempering medium in order to draw the temper for fear of too quick expansion which causes disruption. We must, therefore, reduce the temperature of the heating medium or slowly pre-heat the piece until it approximates the heat of the oven. It is admitted, considerable time must be devoted, or wasted if you please, and during all of this time, the internal strains caused by the quench are playing havoc. They are impatiently awaiting heat for relief. If they

do not receive this heat before they lose their patience entirely, they react, many times to our disadvantage.

Introducing heat into the body of a piece of steel certainly tends to relieve internal strains set up in quenching. The drawing or tempering operation, however, aids in relieving brittleness and at the same time sacrifices hardness. In the light of the above, why would it not be an ideal condition if we could retain maximum hardness, plus toughness and minus brittleness? Many pieces are returned to the hardener with the comment: "Too hard: draw lower." As a matter of fact, they were not too hard but too brittle hard.

Let us not consider the smaller tools such as taps, counterbores and reamers, wherein strains due to quenching, are not sufficiently great to cause disruption but rather a larger piece that dissipates its heat more slowly. For example: a water hardening tool steel block, three inches square, has been heated and is ready to be quenched in fresh water or brine. If the block contains eighty to ninety carbon, the recommended hardening heat would be about 1450 degree

Fahrenheit. In about eight seconds after it is submerged in the quench, it will have hardened to a surface depth of three-thirty seconds of an inch on the faces and one-eighth of an inch at the corners. If we were to leave the block in the quench until it had cooled to the temperature of the bath, the depth of hardness would be no greater. This cooling influence works its way into the block and consequently tends to reduce internal temperature. At some time before the block has lost all of its internal heat it must be removed and placed in a slower cooling medium.

One might ask the question "Inasmuch as we cannot see what is going on inside, how is one to determine at just what time to remove it to the quench?" The answer is: By feeling transmitted vibrations. There can be no reason whatever, why we should not take advantage of every little aid we know to exist, even though it cannot be seen. The casual observer sees

nothing in the quenching operation other than dipping a heated piece in the cooling medium and withdrawing it. When tool steel is being quenched in water it immediately causes vibrations. This is its method of communicating to the operator. It does not require an expert steel treater to feel these vibrations. If a piece one-half inch round were heated on one end and quenched in brine or water, the person holding the cold end, although he may not have had any previous experience, would feel the vibrations caused by the attack of the cooling medium, transmitted through the piece. The experienced hardener would be more adept and would detect them readily.

We are perfectly aware that quenching causes internal strains together with accompanying brittleness. We also know that these strains are not relieved until the end of a successful draw. We know that heat is the only means of relieving these strains. The

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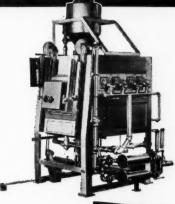
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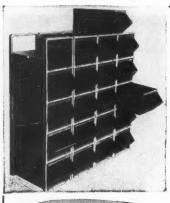
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question arises "Why allow them to exist. Why not eliminate them at the source, in the quench?" We draw the temper from the outside to the center. We must cool or quench from the outside to the center. There can be no logical reason for cooling to the extent wherein these strains are set up and are not immediately relieved. Therefore, suppose we adopt a diametrically different method in drawing the temper. Instead of inducing heat from the outside, let us cool in the quench to a point wherein we are able to allow enough heat to remain in the piece to immediately counteract these strains and reduce them to a point where they are no longer potent.

When we quench in water or brine, vibrations are immediately conveyed to the operator. In a short time, these vibrations will have attained their peak and will commence to subside. It is at this stage that the piece should

be removed and transferred into oil. These vibrations unquestionably communicate to the operator and tell him in no uncertain language when they have had enough cooling and when they should be removed. The tongs employed for holding any piece of steel being quenched, should not be so large and heavy that vibrations are difficult to feel. A pair just large and strong enough to hold the piece safely is only necessary. The exact time of transfer to oil may be determined only by the operator.

Another estimable aid in connection with vibration is counting. If we have a number of pieces, all of the same size and weight, we should start counting off seconds immediately as the piece enters the bath. If, after quenching, the piece tests the correct hardness, an exact repetition with the remainder of the pieces will give like results.



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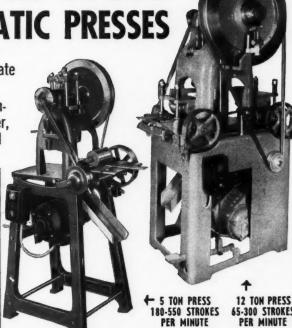
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#### Hardening Carbon Steel Milling Cutters

It will perhaps be wondered why so much attention is being given to carbon steels in this series of articles. Straight carbon steels are universally used. Notwithstanding that fact, they appear to be less understood. They are water quench steels and consequently are subjected to a much greater amount of shock than are the oil hardening types. There was a time when a

hardener did not think a tool had reached its maximum hardness unless it remained in the quench until he could remove it stone cold by hand. Today, that procedure is not being advised.

Let us visualize a carbon steel milling cutter which has been heated slowly to the correct quenching temperature. It is then quenched in brine or fresh water and kept in motion until the teeth have received their chill. It is then removed and quickly sub-

merged in a tank of oil and withdrawn from the oil at a temperature wherein a drop of water placed on the thickest part will sputter and boil. At this point, it is packed into a box of sawdust, previously slightly moistened with oil and allowed to remain until cold.

The teeth of a milling cutter are the working points and require maximum hardness and toughness. The bases of the teeth are much stronger if they are only tough-hard. At the time of removal of a cutter from the quenching bath in the manner described, it will be noticed the heaviest part or hub of the

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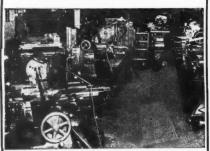
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cutter may be dark red at the time of transfer. This, however, will cause no ill effect, inasmuch as the oil will slowly reduce the excess heat and at the same time prevent the teeth from drawing back.

Cutters hardened by this method seldom if ever lose their teeth by cracking. The arbor hole does not lose its size and it is not advisable or necessary to draw the temper. The slow cooling automatically toughens the cutter and gives it full hardness where required.

A number of years ago, the writer worked in the hardening department in a factory at Cleveland, Ohio. The boss of the tool room, we will call him Dennie, did not show any evidence of disliking me. He did however, on occasion, succeed in showing his displeasure at the idea of the firm trusting such a young chap as I with the hardening of tools and dies made by his pet mechanics. At any event, Dennie, whenever the opportunity presented itself, persisted in riding me. Once he delivered twelve carbon steel angular cutters to be hardened. I proceeded as described above, returned them hardened but without any color showing. Some time later, those identical cutters were returned to me by Dennie, with the following comment. "These cutters are entirely too hard. Draw them to a light straw color." I knew he had not given them a trial, inasmuch as they had not been backed off. I procured some shellac and a small brush, polished the backs of a few teeth on each cutter, warmed them slightly, painted the bright spots a light straw color and sent them along. At a later date, I requested information from Dennie, pertinent to the cutters. He replied "The best cutters we ever had in the shop. If I had not insisted they be drawn, we would have burst the entire lot."

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KELLER CARBIDE DI-BURS for the proper selection of steel from which the dies are to be made. There is really no advantage in selecting a 90 point carbon, either crucible or open hearth steel for hot forging a 15 point carbon open hearth steel. On the other hand, it is advisable to select higher carbon stock if small high carbon pieces are to be forged. A well hammered open hearth block containing from 65 to 75 point carbon is quite ac-

ceptable for striking low carbon open hearth pieces.

There are many instances where it is unnecessary to harden the blocks at all. There are also times when quenching in oil gives sufficient hardness and toughness. A close inspection of the impression in the die, with reference to depth and draft, will convince of the advisability of using water or oil as a quenching medium. Drop dies, or any

other large piece to be hardened. should be heated in an oven with heating capacity enough to allow for correct heating. In many instances, these drop dies are heated in ovens that are entirely too small for the purpose. Any oven incapable of imparting heat to a large piece, thus forcing the burners, should not be used for this class of work. The burners are designed to heat the oven and the oven is designed to heat the work. It makes little difference whether the heating medium be gas, oil, electricity, coke or coal providing the oven is of sufficient capacity and the furnace is built with strict attention paid to combustion, atmosphere, heat radiation and in-



proach to air cylinder control that permits maximum operation flexibility yet eliminates special valves or fittings, reduces valve cost, air cost, pipe and fittings. You can select your control for solenoid, combination of double solenoid, hand, foot, cam or sequence operation. You can reduce installation time, simplify maintenance, keep only a small replacement parts inventory.

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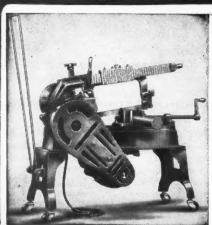
sulation. If the burners do not heat the oven and the oven does not heat the work then the burners are forced to perform both functions and the corners are very liable to heat too rapidly and oftimes too hot, inviting cracks in the following cooling or quenching operation.

If a given temperature is required, possibly 1500 degrees Fahrenheit, the furnace may be brought to at least 1600 degrees Fahrenheit before placing the die in the oven. In other words, if the die is quite large, a primary temperature may be developed in the oven which exceeds the predetermined quenching temperature. There are those who may object to this procedure on the ground that this excessive heat might tend to expand the die too quickly and cause disruption. This contingency has never happened with the writer and it is doubted that it ever happened with anyone else. It would.

however, be to our advantage if it did. It would immediately divulge interior imperfections such as pipes, blow holes or seams and the operation of heating and hardening would be discontinued at that point. Pipes and internal imperfections do not make themselves known when expansion is taking place. It is only when the die is contracting, during or after the cooling process is performed, that such imperfections are in evidence.

After the die is placed in the oven, the burners should be turned down until they are barely firing. The cold die will reduce oven temperature and will absorb oven heat until, in a comparatively short time, they will have both reached oven heat. From this point, the burners come into use and the oven and die are brought to the same temperature together. This method for heating large pieces is not only practical from every point of

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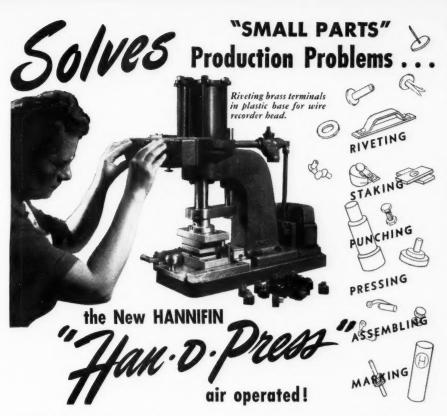
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Angle Cutting Vise **STURDY** 

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view but touches the principle of preheating as closely as is possible, when only one oven is employed and applies to hot forge dies and large forming dies made from any carbon or alloy steel, whether they are to be quenched in water or oil for hardening.

#### Quenching Hot Forge Drop Dies

The importance of properly quenching a hot forge drop die for hardening is manifest. It is during this operation

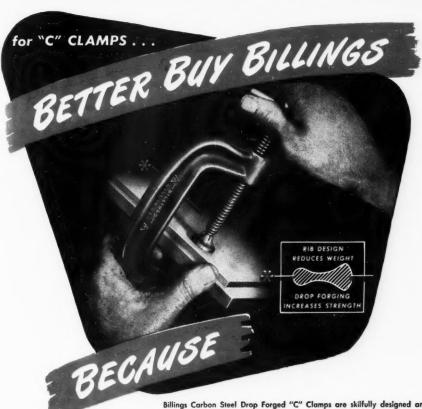
many dies distort or burst. Either or both of these conditions may be averted in the cooling step, provided the heating has been carried through as advised. Improper quenching is certain to cause unequal internal strains during the cooling step and is liable to result in the development of cracks or a raise on the face of the die that is commonly called "Bellying". Hot forge dies are not usually required to be hard at the stool or base but on the work-

ing face only. An upright stream or series of streams are forced against the surface of the die which is submerged below the water level sufficiently to allow the cooling medium, under force, to contact the entire face or surface.

At the same time that the die is being cooled on the face, there should be a sufficient amount of water sprayed on the stool in order to aid the cooling from the back and counteract, in a measure, the cooling from the face. The practice of cooling from the back or stool, also tends to keep the die straight and prevents inclination to bulge on the face. This bulging or distortion is not, however, so liable to occur if



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primary heating for hardening is carried out as described.

Do not allow the die to cool cold but watch the two cooling points. The die is being cooled from the face and the stool. These cooling influences are gradually working toward the center and they may be observed by watching the sides of the die as they approach each other. It will be noted that the center will be the last to cool. When the center is reduced in temperature to the point wherein the redness is disappearing, remove the die and place it in a tank of oil. The tank should be sufficiently large enough to accommodate the piece and should contain enough oil to prevent the remaining heat in the die from raising the temperature of the oil perceptibly. The die should be removed from the oil while yet hot enough to boil a drop of water placed on its surface and afterwards drawn if it is deemed necessary. The method of laying down or reliev-



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ing the internal strain set up in the hardening operation has many advantages. Oil, a much slower cooling medium than water, allows the internal heat to gradually distribute itself throughout the die and at the same time keeps the surface cool enough in order that it does not lose any of its primary hardness. Added toughness at the expense of brittle hardness is also to be gained, in fact, sufficient to obviate the necessity of drawing the temper.

It must be kept in mind that it is the first chill which accomplishes hardening and care should be taken that sufficient water, under pressure, strikes the face to be hardened in order that steam pockets do not develop at the bottom of the impression, resulting in ultimate sinking. Steam pockets or cushions retard cooling and are certain to develop soft spots which cause sinking when the dies are put to work. Cracks often show in the impression of the die, after working only a short time and one is often misled into thinking that the die may be too hard. As a general rule, this is not true. The die, in all probability, was hardened without sufficient depth in the first instance and the hard surface crushes into the soft backing underneath. This condition may be caused by a too low carbon content but is more often the fault of underheating.

In this connection, it might be well to state that a small piece of carbon steel will harden nicely at a low temperature. It does not follow, however, that a large drop die of the same analysis will harden as well at the same temperature, except possibly on the edge or corners. An increase in temperature is therefore necessary in order to insure sufficient hardness and depth of penetration. Large striking dies should be quenched in the same manner as hot forge dies.

The writer stopped at the forge of an old drop forger some time ago and

# LW

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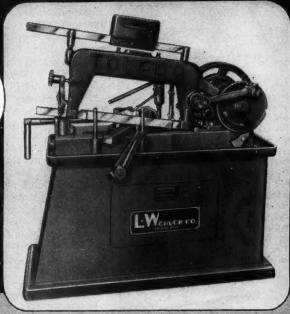
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noticed him directing live steam against the bottom die already set in the press. He was asked his reason for so doing. He replied, "The die is not so liable to break if it is warm and it does not 'Cold Shut' on the edges so badly". Undoubtedly he was correct in his statement. The bottom dies which form hot forgings do 'Cold Shut' along the edges of the impressions after continued use. The old man's statement caused me to do some thinking. It finally dawned on me that there was a reason for this condition. After watching a new drop die in operation for several days, I was convinced that these so called cracks were not cracks at all. The flash of the forging persisted in sticking in the bottom die. The thin impression edges at the top of the die were repeatedly heating and cooling. A continuous blast of air was being played on the face of the die, not for the purpose of cooling the die but to remove accumulating scale. Inasmuch as the heat was developed at a localized point along the impression edges, they were continually expanding and contracting. Also, inasmuch as the die itself was comparatively cold, the expansion and contraction influenced the checking of the edges, resulting in "Cold Shuts."

"Rough Grinding" is the title of a 48-page pocket-size booklet issued by the Norton Co., Worcester 6, Mass., which illustrates and describes Norton wheels for rough grinding in foundries, welding, forge and machine shops. Subjects covered include abrasives and bonds, wheel selection, floorstand grinding, portable grinding, finishing welds, swing frame grinding, disc grinding, mounted wheels and mounted points, cutoff wheels, core files, rubbing blocks, wheel evaluation, grinding cost, grinding wheel dressers, speeds, and wheel shapes. Copy free.

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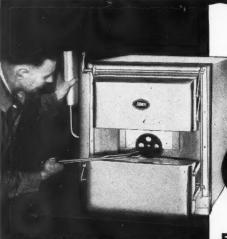
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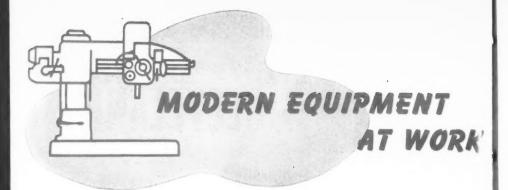
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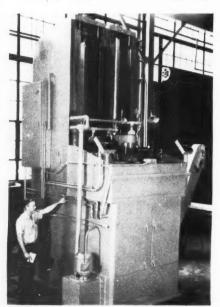
FABRICATING TOOLS

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#### American Duplex Surface Broaching Machine Used for Broaching Diesel Bearing Supports

THE accompanying illustration, Fig. 1, shows a massive duplex surface broaching machine which is used for broaching large diesel bearing sup-



ports such as the ones shown in Fig. 2. The machine, which was built by the American Broach and Machine Co., Ann Arbor, Michigan, is over 15 feet in height and weighs more than 34 tons.

The outstanding feature of the tooling design is the fact that the left hand table of the machine and the right hand broach arbor are both indexed six times in generating a complete broaching cycle. Step joint faces in the bearing support are surface broached in the six passes of the left hand station, and a half round surface is rough broached in the part in the six passes of the right hand station. The bearing support being broached weighs more than 150 lb., and approximately 1/2 inch of stock is removed from 110 square inches of surface on the part.

The machine is equipped with an interlocked electrical controlling mechanism which provides a continuous machining cycle during the passes required to complete one part. The machine has a stroke of 72 inches, and

Fig. 1—34 ton American duplex broaching machine which has enabled a manufacturer to increase the production rate on a job by 20 times.

Fig. 2—Large diesel bearing support which is broached. The part is shown as received at left; the broached step faces are shown at center; and the broached half round is shown at right.



a chip conveyor is provided to handle the excessive amount of chips which is accumulated. The installation of this broaching unit for machining the bearing support surfaces has increased the production rate on the job by 20 times over previous method of machining. ing illustration. In addition, the correct skirt diameter classification of the piston, one of five possible classifications, is indicated by the Multichek. The gaging points and locating cups on the Multichek may be varied to accommodate thirteen different sizes of pistons within a  $3\frac{1}{4}$ - $4\frac{3}{4}$  inch diameter range.

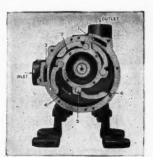
Sheffield Multichek Used to Check Piston Dimensions In operation, the operator can tell at a glance whether or not all of the dimensions are within specified tolerance limits; the master light glows white when all dimensions are correct, and it glows red when even one dimension is incorrect. Individual signal lights for each dimension being check-

**E**LEVEN critical dimensions of a diesel piston may be checked simultaneously by means of the Sheffield Multichek shown in the accompany-

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Sheffield Multichek for multiple inspection of diesel piston.

#### Swiss Precision Jiq Borer in Use at Baker **Brothers Plant**

12 TON precision jig borer which incorporates delicate fingertip control mechanisms to provide for accuracy in terms of millionths of an inch has recently been installed in the plant of Baker Brothers, Inc., Toledo. The machine, which is 10 ft. high and 13 ft. long, was made in Switzerland; and it is only the second machine of its kind to be brought to the United States.

The other machine is located in Cleveland and is owned by the government.

Before the machine was installed, six windows at the Baker plant were bricked up in order to keep out the rays of the sun which might possibly affect the accuracy of the machine by causing expansion of the metal. On installation, the machine was placed in a special air-conditioned room to protect it from dust, temperature variations, and sunlight. The new jig borer is so

ed indicate whether the dimensions are over or under required tolerance limits.

It is said that substantial savings of change-over and set up time, as well as greatly reduced inspection costs, are made possible by this Multichek. The flexibility of this multiple inspection instrument is highly desirable, especially when producing the various parts in small quantity lots. The Multichek is manufactured by The Sheffield Corp., Dayton, Ohio.

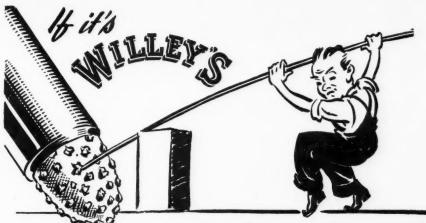
Pictured: a 24-Spindle Heavy-**Duty Drill Head.** 

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W-4	11/32	3/8	13.00	12.00	11.00	10.00	
W-5	3/8	13/32	15.00	14.00	13.00	12.00	20 to 24
W-6	7/16	7/16	17.00	16.00	15.00	14.00	24 to 42

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delicately balanced that the one-ton table, on which parts are rolled beneath the boring head, could be pushed New jig borer at Baker Brothers plant which permits accuracy to millionths of an inch.

along with the pressure of one finger if it were disconnected from the rest of the machine.

Extremely accurate measuring scales are placed above and below the boring head to enable the operator to line up the work to be machined. Accuracy of location is assured since the scales are provided with a series of lenses and prisms to magnify and illuminate the delicate scale graduations. The operator is able to

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AUTO ENGRAVER CO., Inc. 1776 Broadway New York 19, N. Y. The new jig borer uses a combination of electric and hydraulic power for operation; and it is said that, with the machine, it is possible to drill parts more accurately than has been possible heretofore. The jig borer may be seen in the accompanying illustration.

#### Snyder Multiple Operation Machine Used for Automotive Assemblies

A DRILLING, countersinking, and tapping machine which is being used by a manufacturer of automotive upper control arm assemblies is shown in the accompanying illustration. The machine, which was built by the Snyder Tool & Engineering Co., Detroit, was designed to reduce the time required for one complete work cycle to 16 seconds and also to reduce the the amount of floor space required to 25 per cent of the former space requirements.

The machine is designed to have one loading station and two work stations. Four parts are loaded into the machine at one time; they are loaded into guide rails against a rest plate to start the automatic work cycle. The parts are automatically shuttled to the drilling station, a bushing plate equipped with locating pins and spring-loaded buttons is advanced to locate and clamp the parts, and the machining cycle of drilling and countersinking is started. Since four holes are required in each part, a sixteen spindle drill head is used. The drill head is equipped with heat treated alloy spindles mounted in ball bearings and also with adjustable drill adaptors. The high speed steel drills which are used are changed by dropping the bushing plate. For drilling, the stroke is 10 inches, the feed is .009 inch per revolution, and the speed is 60 s.f.p.m.

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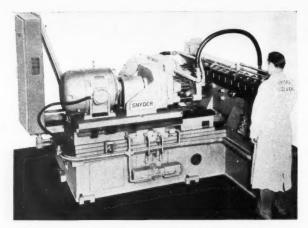
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Snyder drilling, countersinking, and tapping machine which is designed to complete four parts in 16 seconds

individual lead screw type tapping head with heat treated, alloy steel spindles designed for Snyder Safety Tap Drivers. The tapping speed is 40 f.p.m., and the taps are staggered to reduce the power load. At each work cycle, 16 holes having \( \frac{7}{6}''-20 \) threads are completed. When finished,

the parts are automatically unloaded at the rear of the machine.

The drilling head on the machine is powered by a 20 h.p. motor and the tapping head, by a 10 h.p. motor. The work cycle is synchronized to an electrical interlock safety system.

ing operations are completed, the four parts are automatically shuttled to the tapping station and located and clamped in position by a hydraulic pressure plate equipped with locating pins and spring-loaded buttons. The tapping unit is a solidly mounted, sixteen spindle,

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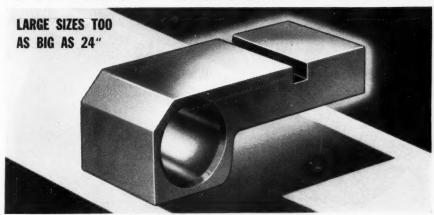
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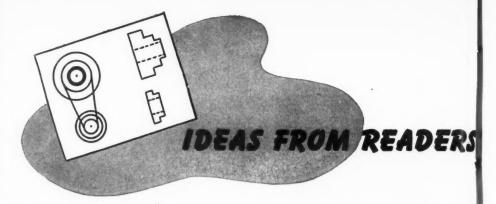
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This Type R-7 Turret Punch Press cut production time from over 12 hours to 73 minutes on short run jobs. Get the proof!

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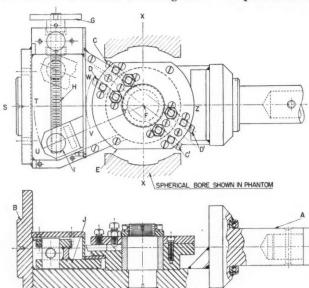
## Fixture Designed for Boring Spherical Holes

By Aaron H. Shum

A HIGHLY efficient boring mill fixture for internal spherical boring may be seen in the accompanying illustration. The attachment is designed for use on a horizontal boring mill. Shank A is fitted on the machine spindle, and plate B is chucked in the outboard support; the entire fixture is rotated slowly, on these centers, and the cutters C, C', D, and D' are fed into the work to cut gradually increasing diameters. The work is shown in phantom in the illustration.

The feed control arrangement is the unique feature of this fixture. As may

be seen in the drawing, cutter head E is rotated a horizontal plane about pivot F. Cutters C. C' and D, and D' are located in slots in this head; and, since C and C' are used for rough cuts, and D and D' for finish cuts. both roughing and finishing operations may be accomplished by the unit in a single rotation



STUVWYZ

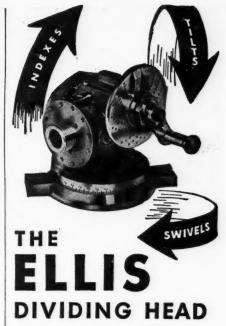
Boring mill fixture designed for internal spherical boring.

of the cutter head. To rotate the cutter head, handle G, which controls the movement of screw H, is turned; and, as the screw is turned, a special nut, I, is moved up on the screw. A feed control plate, J, which is fastened to the cutter head, is allowed to turn on I: and, as I is moved toward the handle, the cutter head is rotated in a clockwise direction. Thus, the movement of nut I controls the movement of cutter head E. As the cutters are rotated in a clockwise direction in the horizontal plane to approach centerline X-X, the rotation of the complete fixture on its axis allows diameters of gradually increasing dimension to be cut. Since the fixture is revolved so slowly on its axis, the feeding may be done by hand, the operator giving the handle one turn after each revolution of the fixture. As may be seen, the cutters are located 180 deg. apart; and both sides of a spherical hole may be bored at one time, the work, in this case, being completed with about 45 deg. rotation of the cutter head.

#### **Auxiliary Control for Shear**

By CLARENCE REYNOLDS

PERATING controls that are in-O conveniently located on a machine not only cause the operator to make unnecessary movements but also cause him to waste valuable working time. A case such as this presented itself in the operation of a shear which was being used to cut large sections of boiler plate in the Louisville & Nashville, South Louisville Boiler Shop. One of the two standard controls with which the machine came equipped is foot-operated and is located at the base of the machine near the front; the other, a hand-operated lever, is provided at one side near the rear of the shear. Because of the distance from the machine that the operator was compelled to stand when cutting large sections



Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6½" normal swing increased to 11" swing through the use of riser blocks. It TILTS more than 100 degrees in the vertical plane—SWIYELS 360 degrees in the horizontal plane—INDEXES by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a universal work head that will increase the production versatility of your milling machines, grinders, drill presses and jig borers—write for complete details today.



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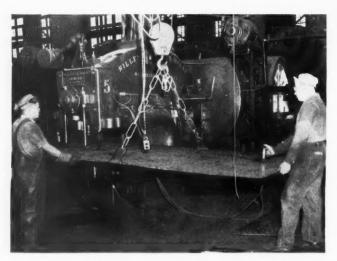


Illustration showing auxiliary control device in use on shear.

the inconveniently located levers,
air control equipment was selected which could be
effectively used
to control the
operation of the
machine. The
equipment consisted of a standard make pushbutton air valve,
a standard make

cylinder and piston, and air hose of a length suitable to permit the operator to control operations at some distance from the machine. Locating

of boiler plate, he found it almost impossible to manipulate either the foot or the hand lever.

To solve the problem presented by

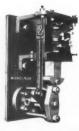
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Nicholson cylinder control valves offer a choice of 6 metal combinations. Other Nicholson features: specially treated hard seats; easily repacked; heavy-bodied; neat, installed in any position. For all mediums: Press. to 5000 lbs.

CATALOG 546.



Types for Most Operating Purposes Lever models,  $\frac{1}{4}$ " to  $\frac{2\frac{1}{2}}{2}$ ", press. to 5000 lbs. Motor, solenoid and foot models,  $\frac{1}{8}$  to  $\frac{2\frac{1}{2}}{2}$ ", press. to 375 lbs.

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Steam & Air Traps Control Valves Expan. Mandrels Arbor Presses Welded Floats

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... the combination of Ames Dial Comparators shown below will allow you to handle practically all of your measuring and control problems.



No. 130 Dial Comparator.

Especially designed for check-

ing comparatively heavy

parts. Size of base and length

of upright post to suit cus-

tomer's requirements.

No. 26P Dial Comparator.

For indicating the most minute variations in size of duplicate parts. Supersensitive Fan Head Dial Indicator graduated in .00005". Total range .002". Adjustable tolerance hands and diamond contact.



This model has a table which is adjustable for height. Lever at left of dial is pushed down to lift indicator rack spindle. Any Ames Indicator can be attached, but the one regularly supplied is Model 202 with dial numbered 0-100, reading .001", having .250" range.



No. 2 Dial Comparator. Compact. Regular or dead weight contact pressure. Table dia., 2". Adjustable for "0" setting. Height 53/8"; weight 23/4 lbs.



No. 13 Dial Comparator. The 8' x 8' cast iron base can be fitted with locating fixtures and V-blocks. The bracket supports any Ames Indicator, but regular equipment is Model 202 with dial numbered 0-100, reading .001", having .250" range.

Address inquiries to Home Office, 29 Ames Street

B. C. AMES CO. Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS MASS CASE AND STEM . Representatives in



the air cylinder at the base of the machine near the existing controls permitted the piston rod of the air cylinder to be attached directly to the hand-operating control lever rod.

To use the auxiliary control, the operator places the push-button control unit within easy reach on top of the large section of boiler plate, as shown in the accompanying illustration, and merely presses the button. The air that is released through the control actuates the piston which in turn now operates the standard controls.

#### Protractor on Emery Grinder Rest Aids in Angle Grinding

By A. H. WAYCHOFF

A USEFUL addition for an emery grinder may be seen in the accompanying illustration and is described herewith. A small, inexpensive

brass protractor, such as those used in schools, is soldered to the top surface of the tool or work rest, as shown in the illustration. Care is taken when locating the protractor on the work rest so that a line passing through the



Brass protractor is soldered on work rest of emery grinder.

90 deg. mark is perpendicular to the grinding surface of the wheel. The protractor may then be used as a handy reference when it is necessary to grind work at an angle. The operator can tell at a glance at what angle (approximately) the work is being held against the wheel. One useful application of this idea may be found in the grinding of twist drills.



218

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# made to AMERICAN SWISS Standards of Perfection

For 50 years, Swiss-Pattern file users have been depending on "American-Swiss" for unvarying top quality in these precision tools.

Now, American-Pattern file users can have similar perfection by using "AMSWISS" Files. These American-Pattern files . . . made in a complete range of types, sizes and cuts . . . can be depended upon for uniform hardness and cleancut, sharp, long-wearing teeth because of the high grade steel, closely controlled processes and rigid inspection standards in their manufacture.

When you need American-Pattern files for any filing job, assure fast work at low cost by specifying "AMSWISS". Write for catalog describing and listing the complete line.





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AMERICAN SWISS FILE & TOOL CO. 410 TRUMBULL STREET, ELIZABETH 1, N. J.

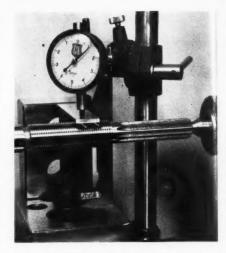
Also manufacturers of Swist-Pattern files, milled curved-tooth files, retary files and mechanics' hand soels.

#### A Method of Checking Pitch Diameter Runout

By E. P. Mc KITRICK

QUICK and accurate method of checking pitch diameter runout of threaded shafts without the use of special, expensive equipment is described herewith. The accompanying illustration shows the set-up being used to check the concentricity of a ground thread on a tapping spindle.

As may be seen, an indicator is attached to a vertical shaft, the indicating point resting on a flat surface which is parallel to the centerline of the shaft. Two wires of the same diameter are fastened to the under surface of the flat plate, and the distance between wires is calculated so that both of the wires will fit into thread grooves. As the spindle is revolved, the wires follow the lead of the thread; and the indicator dial indicates any



Set-up for checking pitch diameter runout of threaded shafts.

possible runout. When taking an indicator reading, best results are obtained by reversing the rotation of the spindle by a slight amount every third of a turn, this reversal tends to eliminate contact between the indicator point and the top of the flat plate and to permit the wires to nest in the thread grooves without interference.

The way to make a man responsible is to give him responsibility. The way to make a man take an interest in you and your business is to take an interest in him and his business.

-George S. Whyte.





DRILL THESE HOLES BY A QUICK, EASY, INEXPENSIVE METHOD

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# Give Greater Production

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# News of the Industry

#### Brown & Sharpe Machine Tool Division Sales Conference

Machine tool salesmen of the Brown & Sharpe Mfg. Company recently returned to the plant in Providence for a four-day conference designed to promote the sale of the company's products. About forty salesmen and representatives from all over the United States and Canada attended. During their stay they were given an intimate knowledge of the most recent designs, sales promotion and advertising programs undertaken by the company to extend the sales of its varied line of products.

Officers, executives and keymen throughout the plant spoke on activities under their jurisdiction. Discussions were held on the line of milling, grinding and screw machines, as well as on repair part service and other functions allied with the sale of Brown & Sharpe machines. New products were displayed and photographic enlargements provided in a specially equipped conference room to supplement the machine demonstrations given under shop conditions.

#### Bullard Company Expands Machine Tool Output

The Bullard Co., Bridgeport, Conn., has announced that its machine tool line will be augmented by products manufactured previously by the Universal Boring Machine Co., Hudson, Mass. According to E. C. Bullard, president, the Bridgeport firm has purchased drawings, patterns. tools, a number of specialty machines and stock from the Massachusetts concern, which was established in 1976 and purchased several years ago by the National Can Corporation.

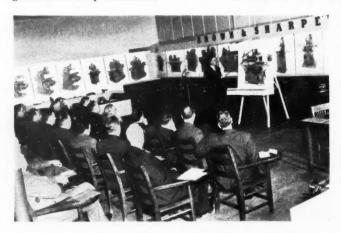
Products previously manufactured by the Universal Boring Machine Company and now to be produced in the Bullard plant include horizontal boring, milling and drilling machines with varied work capacities.

### Instruction Course in Carbide Cutting Tool Practice

An advanced instruction course in carbide cutting tool practice is now being offered at the Wendt-Sonis training

school at Hannibal. Missouri. Designed to provide carbide tools users with information on latest developments and applications, the course, which is given without charge is one week in length. Instructors are practical factory men who bring to the school experience gained in solving tool problems for industry on a nationwide basis.

Equipment used of latest design in standard machine tools. Practical applications cover various turning operations



View of Specially Equipped Conference Room, Showing B & S Machine Tool Salesman in Attendance at Recently Held Sales Conference

# Great wings in CUTTING METAL

Faster metal cutting as the saw moves in one direction and there is a minimum waste of metal as it cuts to precision limits.

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ons rnons A low cost, laborsaving, automatic tool designed to cut anything to lengths within the throat capacity of 8" x 16".



Standard Model for occasional cutting or Wet Model for continuous cutting. Used in thousands of progressive plants.

# MACHINE TOOL DIVISION KALAMAZOO TANK & SILO CO., KALAMAZOO 16, MICH.

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VOID doubt and conflict by always having the correct tool for Inspecting and Checking Flats, Angles or Heights. Acme's Measuring Tools of MEEHANITE METAL are available in many different types:

SURFACE PLATES BOX PARALLELS SLOTTED ANGLE PLATES

FLAT PARALLELS LAPPING PLATES TOOLMAKERS' KNEES . STRAIGHT EDGES

Made of MEEHANITE METAL, these tools are Heat Treated and have either Hand Scraped, Ground or Planed Surfaces, These MEEHANITE METAL Tools are designed to give you long, reliable service.

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New York 7, N. Y.

on soft and heat-treated steel, threading. boring, milling, counterboring, reaming, drilling, and many other everyday shop applications. Part of the instruction is devoted to tool maintenance.

The Wendt-Sonis school is open to toolroom foremen, factory superintendents, machinists, foremen and production supervisors. Details can be obtained by writing the Wendt-Sonis Co., Hannibal, Missouri.

#### University of Iowa Expands Industrial Engineering Film Loan Library

The University of Iowa Industrial Engineering Film Loan Library has been expanded and now includes sixty-five 16 mm. sound and silent films on motion and time study as described in Extension Bulletin 631, copy of which may be obtained without cost from the Bureau of Audio-Visual Instruction, Extension Division, State University of Iowa, Iowa City, Iowa.

The film loan library was originally established by Professor Ralph M. Barnes for use in connection with his course in Industrial Engineering and Management. Last year over a quarter of a million people saw these loan films, copies or which have been sold to industries and colleges in Canada, England, Australia, Holland, Denmark, France and Sweden. The films are finding wide use in training programs given by industry as well as those offered by colleges and universities.

#### R. B. Douglas Elected President of A.S.T.E.

Robert B. Douglas, Montreal, was elected president of the American Society of Tool Engineers at the society's annual meeting held recently in Pittsburgh. Mr. Douglas, who is president of Godscroft Industries Ltd., succeeds I. F. Holland of Hartford.

Mr. Douglas has been a senior member of the society since 1942, is a charter member of the Montreal chapter and has important committee held numerous posts in the organization. Other new officers named include Herbert L. Tigges, Baker Brothers, Inc., Toledo, Ohio, first vice president; J. J. Demuth, Siglo Iron Stove Company, St. Louis, second vice president; and Halsey F. Owen, Purdue University, Lafayette, Ind., third vice president. Reelected as secretary and YOUR FIRST and WISEST CHOICE

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nd 949 Eliminate fumbling and guessing when gaging Holes, Slots, Finding Centers, Locations, Etc.

Horberg Drill Size Pin Gages are accurate to +.0001—.0000.





#### DEPENDABLE GAGING

1½" long. For easy insertion, precision alignment, lower half is concentric tapered to fit holes 0.0012 smaller than gage size. Oil hardened tool steel. No other pin gage has such accuracy at so low a cost.

#### INDIVIDUAL STOCK SIZES \$1.00 each

**LETTER SETS:** 52 gages from A to Z - \$45 **FRACTION SETS:** 60 gages %4'' to %2''' in steps of %4''' - \$50.

NUMBER SETS: 120 gages 1 to 60 - \$90 STAND ALONE - \$10



Sets come in pairs for gaging any number of similar holes. All sets include stands of 3 plates and cover, so that gages stand upright. Drill size is plainly stamped in front of each hole, together with decimal equivalent to the ten-thousandth of an inch.

Prices F.O.B. Bridgeport, Conn. Immediate Delivery.

THE Horbery GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT I CONN.



Robert B. Douglas

treasurer were William B. McClellan, Gairing Tool Company, Detroit and G. A. Goodwin, Master Electric Co., Dayton, Ohio.

New members named to the board are Leslie B. Bellamy, Sterling Grinding Wheel Company; Detroit; V. H. Ericson, president of Johnson de Vou, Inc., Worcester, Mass.; Art Lewis Production Equipment Co., Glendale, Calif.;

and Roger Waindle, general manager, Industrial Products Division, Elgin National Watch Co., Aurora, Ill. I. F. Holland, retiring president and general superintendent of the Small Tool and Gauge Division of Pratt and Whitney, automatically becomes a member of the board. Incumbent directors reelected are Robert W. Ford, J. J. Demuth, H. E. Collins, T. J. Donovan, Jr., Robert B. Douglas, and Herbert L. Tigges.

#### Charles H. Wilson

Charles H. Wilson who perfected the Rockwell Hardness Tester, died in a hospital on March 9. Mr. Wilson began the development of the Rockwell Hardness Tester in 1920 and carried on the business under the name of the Wilson Mechanical Instrument Company. The corporation was sold to the American Chain & Cable Company of Bridgeport, Connecticut, in 1944.

Mr. Wilson was graduated from Columbia University School of Mines in 1902 and four years later began his business career with the formation of the Wilson Maeulen Company to manufacture pyrometers. He bought out his partner after a few years and ran the business himself until 1932 when it was sold to the Foxboro Co., Foxboro, Mass. In 1915, he began the manufacture of a machine marketed under the name Tapalog, which was designed for the multiple recording of industrial heats.

During World War II, Mr. Wilson contributed heavily to the development of microhardness testing and introduced the "Tukon" Tester, which was designed especially for this field. At the time of his death Mr. Wilson was chairman of the board of the Wilson Mechanical Instrument Company.

# PRENTISS

# "BULL DOG" Swivel Base VISES

The base is MACHINED to close tolerances to insure POSITIVE LOCK. The base consists of splitring squeezed against hub on vise body. Free moving action of 360 degrees, yet a positive locking device in any position.

Your Industrial Distributor can furnish.

PRENTISS VISE DIVISION OF THE CHARLES PARKER CO. MERIDEN, CONN., U.S.A.



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Here's the press you need for punching large sheet steel and other stock in a jiffy. Its deep throat gives extra capacity—now enables punching to the center of a 17½" circle! Extra sturdy frame is heavily reinforced at all stress points. Press weighs 340 lbs.!

The new Benchmaster retains all the quality, engineering advantages and proven performance features of the standard model—yet gives you CAPACITY seldom encountered in larger presses! Available as a bench model or with legs as a standard extra. Write for bench model or with legs as a standard extra.



MANUFACTURING COMPANY

tools.

WALL S LARGEST PRODUCER OF SMALL PONCH BOLL



New Plant of Wisconsin Carbide Tool Company

#### Wisconsin Carbide Tool Company Moves to Larger Quarters

The Wisconsin Carbide Tool Company announces the removal of its fabricating activities from Fond du Lac Avenue to a new plant located at 3343 North 35th St., Milwaukee 16. Wisconsin.

Along with providing a greatly augmented manufacturing area, the new plant has been equipped with numerous new machines designed to economically mass-produce carbide-tipped tools.

### Charles D. Oesterlein

Charles D. Oesterlein, former president of the Oesterlein Machine Co.. Cincinnati. Ohio. died recently at the age of 62. Mr. Oesterlein was graduated from Ohio Mechanics Institute in 1906 and entered the firm founded by his father, Wilhelm Oesterlein, in 1886. He became

vice president and general manager of the firm and, after his father's death in 1920, Mr. Oesterlein took over the presidency.

Mr. Oesterlein held various patents in the milling machine field, most notable of which were the tilted rotary miller, patented in 1919, and the offset milling machine, patented in 1933. He was a former president of the Cincinnati Foreign Trades Association and, during his career as a milling machine executive, wrote numerous articles on technical practices for trade publications.

## Anderson

Speed up scraping operations with these efficient blades. They are especially good for hard alloy iron and the extremely hard bronze castings. If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade. They are available in three widths.





Send for Bulletin 5-22

ANDERSON BROS. MFG. CO., Rockford, III.
Hand and Power Hydraulic Presses, Balancing Ways,
Roto Checkers, Hand and Power Scrapers, Spotters.



This improved bond is starting another trend in the abrasive industry. Used only in Chicago Grinding and Mounted Wheels—the result of half a century testing and experience.

F. V. Bonded Wheels will produce finishes that are superior and have a lower RMS without sacrificing production.

REDUCE INVENTORY—Follow the lead of wise planners. Don't tie up money in big stocks of wheels.

AVOID OBSOLESCENCE—By reducing inventory. Get your wheels as you need them, made to your particular specifications.

RAPID SERVICE—Let us hold your stock—without heavy investment on your part. Through the increased facilities of our modern new plant, we are in position to give you the finest service in the industry.

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ENGINEERING
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Let us help with

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SEND DATA SHEET.
INTERESTED IN:
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#### Did You Know?---

Irving S. Levinson has joined Ampco Metal, Inc., Milwaukee, Wis., as manager of the process industries. D. L. Coleman, field engineer in the Detroit district for Ampco since 1943, has been named district manager of the company's recently established Eastern-Texas Division, with headquarters at Houston.

The Chicago Screw Company (precision screw machine products) has announced the removal of its general office and factory to a new location-2701 Washington Blvd., Bellwood, Illinois.

The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, has announced the appointment of J. P. Vederko as works manager, succeeding E. J. McSweeney, who resigned on February 12.

Baker Bros., Inc., Toledo, Ohio, has appointed Machinery Associates, Inc., Philadelphia, Pa., as exclusive dealer in the Philadelphia territory for Baker's line of heavy duty geared feed and hydraulic feed drilling and boring machines, keyseating and contour grinding machines. and special production machinery.

Illinois Tool Works, Chicago, has appointed Tools, Inc., 4427 Germantown Ave., Philadelphia 44, Pa., as exclusive Philadelphia representative for its line of specially engineered hobs, broaches, shaper cutters, and milling cutters, in addition to standard metal cutting tools of all types.

Hy-Pro Tool Co., New Bedford, Mass., has promoted Robert A. Smith to sales manager.

Accurate Bushing Co., Garwood, N. J., has appointed the following representatives: The Stanco Co., Dallas, Tex.; W. S. Gallagher Co., Buffalo, N. Y.; Iver J. Ebenson Co., Denver, Colo.; Frank A. Hart, Rhinebeck, N. Y.; Formrite Tool Co., South Bend, Indiana.

L. A. Dixon, vice president of the Rockwell Mfg. Company's meter and valve divisions, has announced the appointment of C. S. Bygate as assistant vice president.

The K. P. Wesseling Co., St. Louis, Mo., has been appointed exclusive sales representative for Illinois Tool Works, Chicago, in the St. Louis area, according to a recent announcement by E. E. Valy, Illinois Tool Works sales manager.



#### MULTI DRAWERS

Are designed especially to Solve your Small Parts Storage problem Help you do your job BETTER, EASIER, FASTER

#### LL STEEL CONSTRUCTION

FAST ASSEMBLY-Units rigidly interlock Top, Bottom and Sides to form sturdy Cabinet, drawers operate smoothly. Fit any size or space available.

Identification holder-durable green finish.

TWO SIZES . LOW PRICE

M1818 (small drawer unit—5" front to back, 21/8" wide, 21/4" deep—40c each. Accommodates 3 drawer dividers—2 for 5c—Part No. M1011.

M1212 (large drawer unit)—1111/6" front to back, 315/6" wide, 3" deep—\$1.29 each. Accommodates 5 drawer dividers—5c each—Part No. M1213.

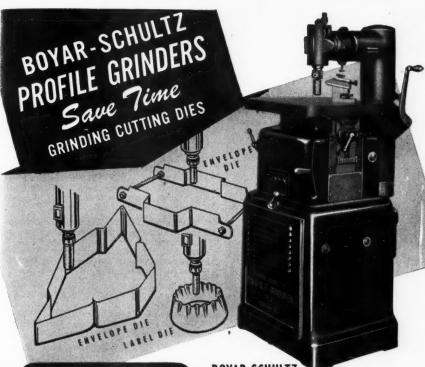
Manufacturers, jobbers write for quantity discounts . . . Multi Drawers ideal for small parts packaging—a merchandiser that will increase volume.

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#### BOYAR-SCHULTZ No. 1 PROFILE GRINDER

A fast operating, precision Machine Tool for saving time in grinding odd and irregular shapes, profiles and difficult contours. Wheels 1/8" to 3/4" turn 20,000 R.P.M.

### BOYAR-SCHULTZ No. 2 Profile Grinder

One of the MANY applications for Boyar-Schultz No. 2 Profile Grinder is in the cutting die field. The above illustrations show how the Grinder is used by Chicago Cutting Die Co., a leader in the industry, for quickly removing excess stock and shaping irregular contours of paper cutting dies. They report savings of one-third or more in production time.

Can this versatile Profile Grinder save time for you?

BOYAR-SCHULTZ CORPORATION 2120 WALNUT STREET CHICAGO 12, ILLINOIS



Which blade? How many teeth per inch? How many strokes per minute? These and other questions puzzle many a hack saw user. If they puzzle you, see your Victor distributor. He has the experience and knowledge to show you how to cut metals and plastics faster, easier and better... how to choose the right blade for various materials... how to get the most from each stroke of the hack saw. Yes, a little advice from the Man Who Knows will save you time and money in the long run.

Ask your distributor for free copies of "Metal Cutting" and the famous Victor Wall Chart containing helpful hints on the selection, care and use of hack saw equipment.



#### Did You Know?---

To better indicate its field of activity, the Standard Reamer & Tool Co., Detroit, Mich., (reamers, cutters and special tools) will henceforth be known as the Special Cutter and Tool Company. All business, engineering and manufacturing activities have been transferred to new headquarters at 401 Salliotte St., Ecorse, Michigan.

John H. Vohr, formerly assistant general superintendent of the South Chicago plant of Carnegie-Illinois Steel Corporation, has been promoted to the general superintendency of the company's Gary Steel Works. Edwin H. Gott, assistant general superintendent of the Gary plant since 1945, has been transferred to South Chicago to succeed Mr. Vohr.

Kennametal Inc., Latrobe, Pa., manufacturer of cemented carbide products, has moved its New York office to 11 W. 42nd St., where L. D. Morton is acting manager, assisted by Gerald O. Bogner, John A. Storrs, and J. G. Brady.

A plant consisting of industrial buildings containing 90,000 square feet located on an eight-acre tract at Mt. Vernon, Illinois, has been purchased by the Wagner Electric Corp., St. Louis, Mo., for the manufacture of transformer tanks.

Richard A. Heald, treasurer of The Heald Machine Co., Worcester, Mass., was elected president at the annual corporation meeting, succeeding his brother, Roger N. Heald, who became chairman of the board of directors. Roger Heald has been president since 1931.

Andrew Wyzenbeek; president of Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill., (flexible shaft machines, flexible shafts, flexible shaft tools, concrete vibrators) has announced the appointment of Robert L. Burke as general manager of the company.

George G. Raymond, Jr., sales manager at the Lyon-Raymond Co., Greene, N. Y., was recently elected to the office of vice president by the board of directors. In addition to his new duties, Mr. Raymond will continue to act as sales manager.

Clifford J. Baxter, for the past 25 years district manager of the company's Chicago office, has been appointed general sales manager of the Gisholt Machine Co., Madison, Wis. Howard V. Myers succeeds Mr. Baxter as Chicago district manager, assisted by Erv. A. Huza.

# SANFORD

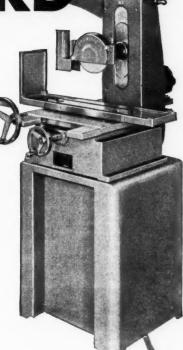
## SURFACE GRINDERS

Model MG

Exceptionally sturdy, outstanding in quality performance and of long lasting accuracy.

Handles wide range of Tool and Production jobs, form and crush grinding, dry or wet.

Actual capacity: 8-3/4" transverse, 13" longitudinal, 12" vertical under 7" dia. whisel with adapter.



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#### **BENCH Model SG**

A sensitive, highly accurate machine specially designed "for the job that fits in your palm."

Actual movements — Transvers 4" — ongitudinal 8" — Vertical (under

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SANFORD MANUFACTURING CO.
1021 COMMERCE AVENUE
UNION, NEW JERSEY

#### Did You Know?---

Hanscome-Rogness, Inc., 1030 Second Ave., S., Minneapolis 3, Minn., has been appointed representative in the State of Minnesota and the northwestern section of Wisconsin for the line of pneumatic and hydraulic devices manufactured by the Anker-Holth Manufacturing Co., Port Huron, Mich. The H. E. Stone Engineering Co., 2 E. Haddon Ave., Oaklyn, N. J., will represent Anker-Holth in the States of Maryland and Delaware, the eastern half of Pennsylvania, and the southern half of New Jersey.

The appointment of Howard M. Givens, Jr., to the post of general manager of tool and high speed steel sales for the Crucible Steel Company of America has been announced by W. H. Colvin, Jr., president. Mr. Givens, who will make his headquarters in New York, was formerly manager of bar and roll sales for the Midvale Co., Philadelphia, Pennsylvania.

The Tesa Corporation of Switzerland, manufacturer of precision instruments, has appointed the Wacker Sales Co., 35 Wacker Drive, Chicago 1, Ill., as Midwestern sales representative for its Imicro internal micrometers.

Ralph H. Lott has been appointed coordinator of sales for The Sterling Grinding Wheel Division, The Cleveland Quarries Co., Tiffin, Ohio. Arthur J. Schneider has been named general sales manager and will have managerial control of the sales staff, while William F. Schlick has been assigned to the position of district manager of the company's Chicago branch, a position vacated by Mr. Lott's transfer to Tiffin.

Vernon H. Olson, formerly works manager for the DoAll Co., Des Plaines, Ill., has been appointed general sales manager for the W. O. Barnes Co., Detroit, Mich., (hack saw and band saw blades).

James M. Darbaker has been appointed general manager of sales, Carnegie-Illinois Steel Corporation. Stephen M. Jenks succeeds Mr. Darbaker as Chicago district manager of operations.

Howard N. Maynard, president of the Snyder Tool & Engineering Co., Detroit, Mich., has announced the promotion of Leo P. Gajda from the position of chief draftsman to director of engineering, succeeding George D. Melling who has left Snyder to form his own company in partnership with Howard McCoy.

# ABRASIUE SURFACE GRINDERS

#### **EXCLUSIVE AGENTS**

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BOSTON 16, MASS. Rudel Machinery Co., Inc. 532 Statler Bldg.

BUFFALO 7, N. Y. Keller, George Machy. Co. 1807 Elmwood Ave.

CHICAGO 6, ILL. Marshall & Huschart Machy. Co. 571 Washington Blvd.

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Machy. Co.
KNOXVILLE 5, TENN.
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LOS ANGELES 21, C. Henes-Morgan Machy, Co. Ltd. 2026 Santa Fe Ave.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, R. I.

CLEVELAND 13, OHIO
Motch & Merryweather
Machy. Co.
715 Penton Building
Machy. Co.
Ave., N.

NEW ORLEANS 6, LA. Dixie Mill Supply Co., Inc. 901 Tehoupitoulas

NEW YORK CITY 17 Rudel Machinery Co., Inc. 100 East 42nd St.

NORFOLK 1, VA. Tidewater Supply Co., Inc. P. O. Box 839

OMAHA 2, NEB. Cardinal Supply & Mfg. Co. 427-30 Sunderland Bidg.

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Tidewater Supply Co.
ROCHESTER 4, N. Y.
Keller, George Machy. Co.
509 Commerce Bidg.
SAN FRANCISCO 7, C.
Jenison Machinery Co.
20th & Tennessee Sts.
SEATTLE 4. WASH.

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ABRASIVE

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VERTICAL



# B-RIGHT-ON SOCKET SCREWS

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## "UNI-QUALITY"

Yes, all B-Right-On Socket Screws are of one quality . . . the highest. Heads are concentric with the threads, which are a uniform No. 3 fit. Sockets are of uniformly correct size. Faces are flat and uniform, points are smooth and perfectly formed.

The high, never-varying quality of B-Right-On Socket Screw Products is the reason these "uni-quality" screws are preferred by mechanics and purchasing agents alike.

#### **BRIGHTON SCREW & MFG. CO.**

READING RD. AT DORCHESTER CINCINNATI 2, OHIO

#### Did You Know?---

The Butterfield Division, Union Twist Drill Co., Derby Line, Vt., (taps, dies, reamers, and other industrial cutting tools) has appointed Johnson-deVou Inc., 58 Brookline Ave., Boston, Mass., as distributor for the Boston area. Johnson-deVou offices in Worcester and Springfield will also handle the Butterfield line.

E. K. Wells, president of Charles H. Besly and Co., Chicago, Ill., has announced the opening of a new Detroit office at 7376 Grand River Ave., Detroit 4, Mich., where E. W. Hutchinson will be in charge of the grinder and abrasive division and J. E. White, tap sales.

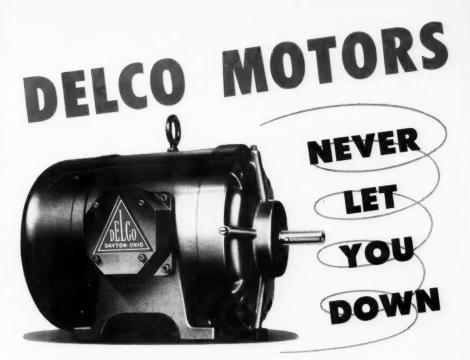
Ralph M. Johnson, formerly vice president and general sales manager for the company's abrasive division, has been appointed vice president in charge of sales by the Norton Co., Worcester, Mass.

Arthur C. Heller has been elected president of the Heller Bros. Co., Newark, N. J., (files, rasps, hammers, and other hand tools, as well as tool steel).

Russell J. Skinner has been appointed assistant district manager of the United States Steel Company's St. Louis warehouse.



"This! Miss Jinks . . . Is a Dog!"



Delco polyphase motors, totally enclosed and fan cooled, are produced in sizes from fractional ratings to 75 h.p.



From both an electrical and a mechanical standpoint, Delco industrial motors are designed and built for continuous peak performance—there's no down-time with a Delco. The truth of this statement will be apparent to anyone making a unit-by-unit examination of a Delco and discovering among its components such engineering advancements as a double-shell, corrosive-resistant, castion frame; Delcote-insulated coils; unit-cast rotor and shaft, dynamically balanced; positioned bearings; simplified lubrication; water-tight conduit box. It is plus values such as these which help to explain why Delco motors stand up to their jobs—why they operate at less cost for a longer period of service. You can depend on Delco for motors that are RIGHT for your individual jobs.

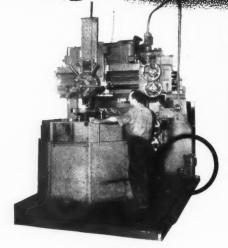
For complete information on Delco motors write Delco Products, Dayton, Ohio, or call our nearest sales office.

## **DELCO MOTORS**

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION

SALES OFFICES: CHICAGO . CINCINNATI . CLEVELAND . DETROIT . HARTFORD, CONN.

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# The Superiority of RUTHMAN GUSHER COOLANT PUMPS

Illustration:

Master Vertical Turret Lathe equipped with Model TL7320 1/2 HP Ruthman Gusher Coolant Pump



The real test of a coolant pump is how well it does its job on your metal-working machine. Here Ruthman Gusher Pumps show their outstanding superiority. You get instant Coolant flow—there is no lag between the start of the machine and the delivery of coolant.

Simple sturdy construction of Ruthman Coolant Pumps with fewer parts to wear, less vibration through precision balance, assures you of long life—minimum maintenance cost.

See for yourself the superiority of Ruthman Gusher Coolant Pumps by specifying them on your new equipment. Write for our new catalog today.

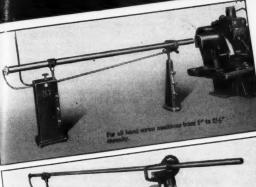
THE RUTHMAN MACHINERY CO.

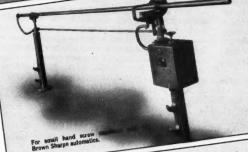
1817 Reading Road

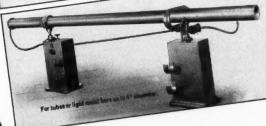
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# IN ONE FEED-OUT

can you feed any desired length up to full length of stock?







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Lipe Bar Feeds make long feed-outs possible. The piece is not grabbed by feed fingers; instead, it is pushed automatically by an air driven piston.

Feed-fingers and feed-finger mechanisms are eliminated entirely, yet these Bar-Feeds will feed any required distance right up to the smallest end-piece. This is done without marring, scratching, or deforming. A fast, safe method that steps up production, saves spoilage!

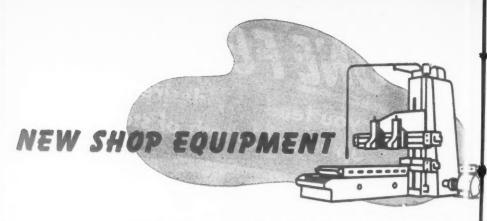
Lipe Bar Feeds Are Made For Any Type Machine Where Stock Is Fed Through A Spindle.

You can get a Lipe Bar-Feed for your automatic or hand-operated screw machine, however small or large it may be.

### WRITE or CALL US

for complete descriptions and engineering data on the Lipe Pneumatic Bar Feeds. No charge or obligation, of course.

Lipe-ROLLWAY CORPORATION, Syracuse 1, N. Y., U.S.A.



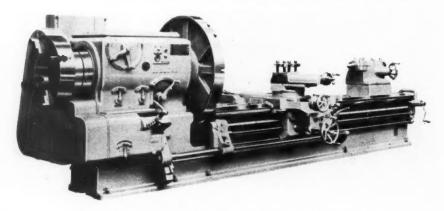
#### Combination Sliding Bed Gap-Hollow Spindle Lathe

According to an announcement made by The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio, two established Le-Blond lathes-the 25/50-inch sliding bed gap and the 27-inch hollow spindle-have been combined into one machine with a swing capacity of 601/2 inches within a 5-foot-wide gap and a spindle hole of 121/2 inches. A totally-enclosed, automatically lubricated quick-change box is incorporated in the lathe which also features a geared headstock with heat-treated steel gears; a carriage which permits facing full swing of the gap; hardened and ground steel bed ways front and rear on upper bed, and other advantages.

Large bore chucks can be fitted to both

ends of the hollow spindle, and faceplates may be mounted on the flange-type spindle nose. Detachable levers are provided for easily moving the tailstock and the upper bed. Standard accessories and attachments are available for broadening further the capacity of the lathe.

Condensed specifications for the Le-Blond Sliding Bed Gap-Hollow Spindle Lathe are as follows: swing over bed and carriage wings, 33½ inches; swing over gap, 60½ inches; distance between centers — base length bed — closed, 8 feet; distance between centers—base length bed—extended, 13 feet; spindle hole (size), 12½ inches; spindle speeds (number), 12; spindle speeds (standard range), 5-213 r.p.m.; spindle speeds (range with 2-speed motor), 2½-213 r.p.m.; motor recommended, 25/12½ h.p. 1200/600 r.p.m.



LeBlond 25/50-Inch Combination Sliding Bed Gap-Hollow Spindle Lathe

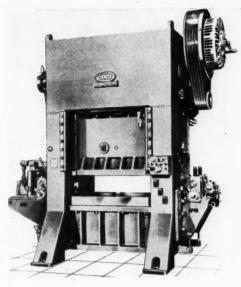
#### Precision High Production Presses

A complete line of medium to high tonnage mechanical presses designed especially for stamping operations employing standard, progressive, or multiple dies is now offered by Danly Machine Specialties, Inc., 210 S. 42nd Ave., Chicago 50, Ill. The line includes high production units having speeds to 250 strokes per minute with capacities from 50 to 800 tons. Automatic feed of coil and strip stock is used effectively in the presses to increase part output. To suit job requirements, the presses may be obtained with the following drives; direct non-geared crank drive; single reduction gear eccentric drive; and double reduction gear eccen-

Press frame components, including base, uprights and crown, are made of heavy steel sections, welded and stress relieved. The bed is fabricated from steel plate. Extra long gibbing is provided to increase slide accuracy. The slide is counterbalanced with suitable air cylinders to hold drive elements in compression and thus assure quick, smooth press action. The heavy steel crown encloses and protects the press drive gear mechanism. The bed, crown and uprights are precision machined, assembled, keyed in alignment, and locked into an integral unit with high carbon steel tie rods.

To ensure long operating efficiency, a floating friction block clutch is employed which enables 85 per cent of flywheel momentum to be transferred to the drive shaft upon engagement. Most of the clutch parts rotate with the flywheel at all times and add to its momentum. As a result, clutch wear is greatly reduced. The clutch is a fan-cooled, air-operated unit and is mounted externally to simplify maintenance. The clutch is activated by an electric solenoid controlled through a push-button station.

The brake is released by an air cylinder which automatically opens the brake when the clutch is engaged. The press cycle is stopped by closing the air cylinder which permits spring pressure to be applied against the brake shoe. This pressure is constant and, should there

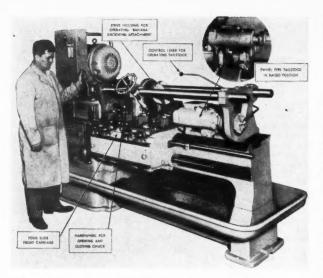


be an air or power line failure, the brake is automatically spring set.

An efficient automatic oiling system accurately delivers the required amount of filtered oil to each point lubricated. Oil is circulated to the press crown and piped directly to the bearings, gears and moving parts. Flow is controlled and, as the oil passes from the part being oiled, it is directed downward to the sump.

#### **Automatic Lathe**

The "Lo-swing" Model "LR" Automatic Lathe illustrated herewith, product of the Seneca Falls Machine Co., Seneca Falls, N. Y., is designed to turn and chamfer all bearings and oil pump gears of a camshaft and to cut interrupted oil or "banana" grooves in a single operation. This center drive lathe is equipped with a special two-jaw scroll chuck which clamps and drives the shaft from the cam located adjacent to the number three bearing. The chuck jaws are opened and closed with a permanently mounted, gear type, handwheel shaft. The air-operated swivel type tailstock is operated with two air cylinders, one of which swings the hinged upper section vertically to permit easy loading and unloading in a line parallel with the centers, thus eliminating all overhang of the tailstock center. The second air cylinder controls the movement of the spindle



"Lo-swing" Model "LR" Lathe Set Up to Automatically Turn Camshafts in Single Operation

quill. Both movements are controlled by a four-way control valve.

The "banana" grooving attachment is driven and timed from the main drive shaft and imparts a shuttle motion to the grooving toolslide which is mounted, with other squaring tools, in block on the rear slide. The driving head swivels on the chuck drive housing and follows the "feed in" and "feed out" movement of the rear slide. The "banana" grooves, it is claimed, are always cut in definite relation to the chucked cam on the camshaft.

The machine cycle is as follows: The operator places the camshaft between centers, closes the chuck jaws and operates the spindle starting lever. The front carriage slides and tools advance in rapid traverse to the cutting position and then slow down for normal feed. The squaring, chamfering and grooving tools, mounted on two automatic back squaring attachments, are timed to cut immediately after the front turning tools have ceased cutting. Immediately after the rear tools have ceased cutting, all tools and slides are returned to the starting position in rapid traverse. All movements are automatically controlled.

#### **Electric Industrial Box Furnace**

An electric box furnace featuring elements in which the resistors are embedded in ceramic slabs is now being of-

fered by the Cooley Electric Manufacturing Corp., 34 S. Shelby St., Indianapolis 7. Ind. In the side walls the elements are so placed that an air space is left behind. above and below the slab which then forms a baffle wall creating a natural convection when heated. This arrangement, it is claimed, not only equalizes furnace temperatures but causes cool operation of the element and furnace wall, the effect being to develop

unusually rapid heating, uniformity of chamber temperatures and marked economy in operation. The quick removal of heat from both sides of the element is said to greatly lengthen element life.

Another feature of the Cooley Industrial Box Furnace is the door that completely covers the operating end of the furnace and actually insulates the front section equally with the other furnace walls, thus reducing heat losses to a minimum. The vertically operated door mechanism consists of a counterweighted yoke which pivots on anti-friction bearings. The door closes gently but firmly against the face of the furnace in a manner that is said to eliminate any chance for shock to the refractories. When desired, a foot treadle can be supplied for operating the door. In addition, the door provides for non-obstruction to the entire heating chamber, and can be raised to the full limit to permit the removal of all units-top, bottom, sides, rear wall, and the door-without disturbing any mechanical parts of the furnace.

The furnace can be furnished with full automatic control equipment e it her mounted in a completely wired control panel, including multi-breaker line switch and fuses, or arranged so that the control and switch equipment can be mounted on a wall separate from the unit. Where the control apparatus is mounted in the control panel, it becomes an integral part of the furnace and forms a complete unit that requires only con-

# made to Starrett Standards

#### ...and American Gage Design Specifications

BACK — A solid die casting with clamping lug. Lug may be on or off center or adjusted at right angles to the spindle. Black crackle finish.

0

CASE—Concentrically machined with stem cast integral. Chromium plated. Stainless steel bushings support spindle in the stem.

**BEXEL**—A die casting with coarse peripheral serrations. Turns dial in relation to the hand. Chromium plated.

BEZEL CLAMP — Securely locks bezel in any position. Chromium plated. Patented.

DIAL — Specially enameled for easy cleaning. Graduations distinct and accurate.

HAND — Tempered steel, blued finish. Nicely balanced and will not slip on the center pinion. Formed to facilitate reading over graduated lines.

JEWELS — Genuine Sapphires in special mountings for ready replacement. Provide the thrust of staff shoulders and give a smoother action to the gage.

CRYSTAL — Thick, clear Pyralin, transparent as glass and nonbreakable.

BRIDGE — Hard bross, nickel plated.
Slotted and finished to permit using an unusually long guide pin which prevents rotative movement of the rack.

RACK AND SPINDLE SPRING — A coll spring of uniform and correct tension eliminates harsh action of the rack and spindle.

SPINDLE — Stainless Steel. Travels in bushings, also of stainless steel. Holds the unumally long guide pin.

GEAR TRAIN — Stainless Steel including the hair spring. All gears and pinions cut and finished to extreme accuracy.

PLATE — Hard brass, nickel plated, uniformly machined. This is the base plate to which all working parts are attached.

STARRETT DIAL INDICATORS Starrett Dial Indicators, Series Nos. 25, 81, 655 and 656 conform in all respects to the requirements of American Gage Design Specifications and, in addition, provide many exclusive Starrett features which contribute to greater durability, accuracy and efficiency in use. For complete information, write for Piere information, werte total Starrett Dial Indicator Catalog MD.

# Starrett

#### Standard of Precision

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS - DIAL INDICATORS - STEEL TAPES - MACKSAWS AND BAND SAWS - PRECISION GROUND FLAT STOCK

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# AT LAST!

#### A Profile Projector

that practically anyone can use ... EASILY ... QUICKLY

For checking and measuring at different magnifications and illuminations.

Interchanging Parts Done Away With!
All Optical Parts Are Built In!



PROFILE PROJECTOR (P 215)

#### Special Luminosity Features:

- Has perfect sharpness of image, right into corners of screen.
- So strong, surface areas show clearly under episcopic illumination on 50 and 100 magnifications.
- Permits examination and checking of the surface of opaque objects.

Comes complete with objectives for magnifications 10, 20, 50 and 100X.

Also, a graduated rotary screen with hairline cross for degree measurements can be furnished.



#### MANHASSET, N. Y.

Representing Henri Hauser, Ltd., Bienne, Switzerland. Extensive line of Swiss Precision Borers, Grinders, etc. Get illustrated bulletin giving complete details and specifications for this Hauser Profile Projector.

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Kindly send illustrated bulletin giving complete details of Hauser Profile Projector P 215.

Address ..... Zone. State.....

necting into a 230-volt single or threephase power line to place the furnace in operation. All standard types of pyrometers are available and the type desired can be specified to suit the user's requirements.

The Cooley Industrial Box Furnace is supplied in the three sizes, each having chamber dimensions of 12 inches wide x 8 inches high. Respective lengths are 18, 24 and 36 inches with power inputs of 11.5, 14 and 18 kw. Each model is built



Cooley Electric Industrial Box Furnace

for maximum heating temperatures of 1,850 deg. F. and for either single-phase or three-phase 230-volt operation.

#### Spot and Arc Welders

The Delta Manufacturing Division, Rockwell Manufacturing Co., 602 E. Vienna Ave., Milwaukee 1, Wis., annouces three new welders—the Delta-Milwaukee "Dual-Weld," a combination spot and arc welder; 5 kva spot welder; and a portable 120-ampere arc welder.

The Delta-Milwaukee Dual-Weld is 14 inches wide x 19% inches high x 26% inches long, and is especially suitable for use in maintenance and repair depart.

# 40U CAN'T BEAT



# BY-PASS OIL-RELIEF VALVES



W ITHOUT fuss or expense—after original installation—these FULFLO VALVES go about their duties, noiselessly and uniformly to provide and maintain desired pressures.

- CHATTERLESS
- NO MAINTENANCE REQUIRED
- INSTALLED EASILY

5 springs to determine pressure; cast iron or bronze bodies; brass, hardened or stainless steel pistons; for pressures from 0 lbs. to 350 lbs.; for pipe sizes from 1/4" to 2".

#### WRITE

on your letterhead, please, for FULFLO MECHANICAL DATA BOOK



Specialties Co., Inc.

ments of factories, in experimental laboratories, in research departments, and in radio, electric, electronic and other light metal fabrication industries, as well as in garages, by small sheet metal contractors, and in any other shop having the proper current. The unit is designed to spot weld, arc weld, solder and braze. Its 10-inch throat depth permits spot welding to the center of a 20-inch sheet. A hand lever allows for simple and quick changeover from arc welding to spot welding.

The one-piece welding horns of a solid, high-conductivity, high-strength copper

alloy casting are said to eliminate inefficient electrical joints, reduce maintenance, and provide maximum current for spot welding. The wound transformer core for extremely low watt-loss is an outstanding feature of the combination unit. Equipped with silver alloy contact points for maximum life, the simple contactor is easy to change over for timer operations and provides for easy operation and control of the weld cycle when operated manually.

Especially important for non-ferrous and extremely light jobs is the fact that full spot weld pressure adjustment af-

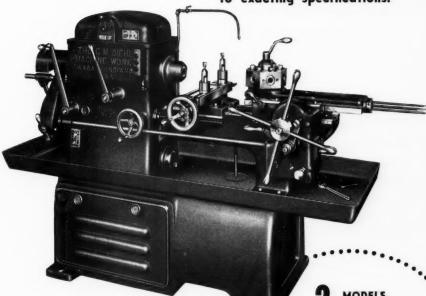
fords infinite control from minimum to maximum pressure. Infinite adjustment and current control via the calibrated current scale is also a feature. In addition, the current scale provides for accurate reading of current output, thereby allowing job records to be accurately kept for future reference on identical work. glass-cov-Double ered wire with a wrapping of glassmica-glass insulation and fiber-glass tape protect all transformer coils against burnout.

The Delta - Milwaukee 5 Kva Spot Welder is designed for manufacturing plants, light fabrication industries. sheet metal contractors, and other shops and places where proper current is available. According to the manufacturer, the welder delivers a maximum of 7,000 amperes, operates on 230 volts, singlephase 50/60 - cycle a.c. and will weld at a production rate of 2 pieces 16 gauge clean mild steel.



# Diehl 2 Turret Lathes

assure accurate, smooth cutting to exacting specifications.



Diehl lathes are unsurpassed for high speed, precision performance... belt-driven transmission of power to assure smooth, accurate cutting to rigid specifications. Diehl No. 2 Lathes are standard size and use same tooling, including collets, as other standard No. 2 sizes. They give years of economical, vibration-free service with ample power for extreme production requirements.

3 MODELS AVAILABLE

- Power Feed to Turret—Screw Feed Cross Slide
- Power Feed to Turret—Lever Feed Cross Slide
- Hand Feed to Turret—Lever Feed Cross Slide

Write for illustrated literature and specifications.

The G. M. Diehl Machine Works, Inc.

WABASH, INDIANA, U.S.A.

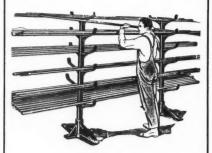
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## -WANT QUICK SERVICE

The BROWN SECTIONAL STOCK RACK eliminates loss of time in your STOCK ROOM to such an extent that it pays you back its first cost in a surprisingly short time. The time previously lost in endhauling each bar of stock its entire length is saved by the BROWN SECTIONAL RACK which requires but a few inches of side movement.



Each length, width and thickness of stock is displayed in Gold-Fish visibility for instant selection and workmen waiting for stock are served without waste of time. The BROWN SECTIONAL RACK is a simple, durable article built in five styles from standard inter-locking metal sections. It cannot burn, sag or twist; unattached to the building, it can be moved at will. Changes in length of stock can be met by moving the units nearer or further apart. while increases of stock can be met by simply adding more standard units. Built from metal thruout, depreciation is practically nil. SEND FOR BULLETIN 26-M.

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Operated on a reduced voltage of 115 volts, the spot welder's output reduces sufficiently to make possible the welding together of extremely fine wires without overheating or burning. In addition, the welder can be quickly and easily converted to a fully automatic high production spot welder by adding air equipment and a weld timer.

The duty cycle of the Delta-Milwaukee Spot Welder is 40 per cent. The machine



Delta-Milwaukee "Dual-Weld" Combination Spot and Arc Welder

has a 2.7-volt open circuit secondary voltage and a rated primary current of 21.8 amperes. Its overall dimensions, throat depth, electrode size and size of replaceable tips are identical to those of the Delta-Milwaukee Dual-Weld Combination Welder.

The Delta-Milwaukee Portable Arc Welder is rated at 120 amperes at 25 load volts. It is a light duty limited-input transformer type welder for use in farm shops, garages, repair shops, schools, maintenance and salvage departments, sheet metal shops and other workshops. Its speedy voltage recovery provides a



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Surveys and time studies of burring, finishing, cleaning and polishing frequently reveal that all can be combined into one operation—at substantial time savings—through the use of "rubber-cushioned" Brightboy abrasives. This speedy, simple operation follows the rough grind and bridges the gap between the grind and the buff. Brightboy works to close tolerances, can be shaped to contours, requires no before-use preparation or dressing.

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steady arc, and the current has infinite adjustment between 30 and 120 amperes. Constructed to stand maximum abuse, the transformer is protected against grounding or shorting. The 65-volt open circuit secondary voltage makes for unusual ease in starting the arc, and the locking type jack receptacle facilitates easy removal of the arc welding cable.

The machine is mounted on removable casters and is easily portable. Its open circuit voltage is 65 volts; its duty cycle at rated load is 20 per cent; its current in-

put at rated load is 33 amperes and 0.85 ampere at no load, and its power factor is 55 per cent. The temperature rise is 90 deg. C. Electrodes recommended for the welder range from 18 to 1% inch in diameter.

#### 7-Inch Precision Bench Shaper

A 7-inch precision bench shaper for toolroom and industrial use has been announced by the South Bend Lathe Works,



No, this "Merry-go-round" never broke down, but it does break production bottlenecks every day, thanks to versatile De-Sta-Co-Toggle Clamps!

It's a high-production assembly fixture for a new plastic ink pad. Here, the bottom of the case is being bonded to the body. Requirements: fast bonding cycle . . . positive clamping pressure for a perfect bond . . . precise alignment of work pieces for accurate assembly. Rapid toggle action, sure holding pressure, rugged durability and well-engineered design make De-Sta-Co No. 207U Toggle Clamps the tool designer's logical choice for this application.

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**DETROIT 3, MICHIGAN** 

386 E. Madison St., South Bend, Ind. Main castings for the shaper are made of closegrained semi-steel. The ram and table slides are milled and hand-scraped for precision fit and are provided with adjustable gibs. The bull gear shaft and countershaft revolve in Oilite bearings. All gears are machine cut from steel or gear fiber for smooth, quiet operation. Backlash is held to a minimum by fitting parts to extremely close

tolerances.

The ram is 18 inches long and has ample bearing rigidity in all positions. The length of the ram stroke (0 to 7 inches) is adjusted by shifting the rocker arm shoe until the witness mark corresponds with the desired figure on the rocker arm. This adjustment is made with the crank shoe at the extreme top of its stroke. A large handwheel aids in making the adjustment. Cutting speed is variable from 3 to 114 feet per minute. Stroke rates of 42, 75, 120 and 195 per

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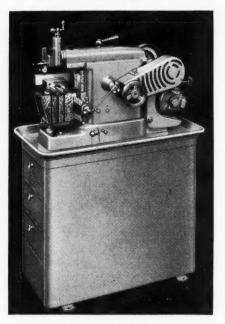
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minute are obtained by shifting a V-belt on 4-step cone pulleys. A quick-acting belt tension release facilitates belt changes. The cutting position of the tool is adjusted by releasing the rocker arm assembly lock on the ram.

The tool head has a 3-inch feed, can be swiveled to any angle, and is provided with a positive lock. A swivel clapper box allows tool clearance adjustments to be made. A clear cut graduated collar

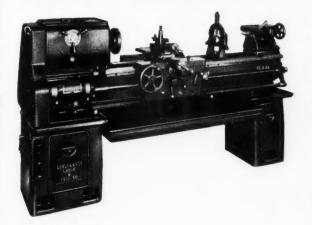


South Bend 7-Inch Precision Bench Shaper

on the feed screw reads in thousandths of an inch. The tool post provided is designed to accommodate tools with shanks % x % inch.

The work table is  $5\frac{7}{16} \times 5 \times 6$  inches deep, is slotted on the top and sides, and has holes for attaching the vise and special work clamps in various positions. The table is equipped with an adjustable outboard support to the base. Reversible power cross-feeds for the table range from 0.002 to 0.016 inch per ram stroke. A graduated plate indicates the feed. Horizontal table travel is 91/2 inches, vertical travel is 5 inches, and the maximum distance from the table to ram is 51/2 inches. The vise has a graduated base

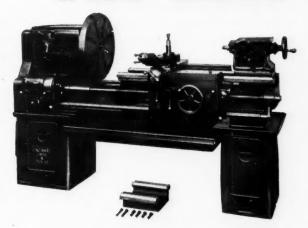
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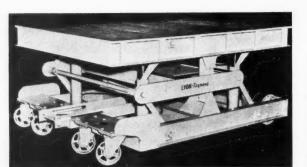
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Lyon-Raymond Hydraulic Elevating Table

and can be swiveled to any angle. The vise jaws are 4 inches wide x 1 inch deep and open to 4 inches.

The ½ h.p., 1,725 r.p.m. motor required for power is mounted on a cradle attached to the back of the shaper.

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For handling large cumbersome dies, the Lyon-Raymond Corp., 1504 Madison St., Greene, N. Y., has developed a hydraulic elevating truck which has a capacity of 20,000 lb. and is provided with a top 60 inches wide x 84 inches long. Four hydraulic cylinders provide a 16-inch range of elevation from 26 inches in the lowered position to 42 inches when fully elevated. The power operated pump has a ¾ h.p. motor which can be oper-

ated on an ordinary 110-volt circuit. Other electrical specifications can be furnished.

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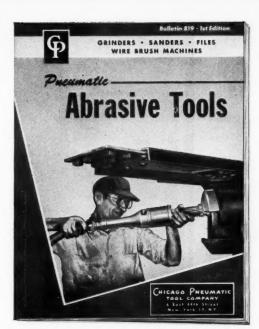
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If you use abrasive tools, you'll be interested in Bulletin No. 819, just issued by Chicago Pneumatic.

It contains descriptions, detailed specifications and application pictures covering the wide CP line of pneumatic grinders, sanders, files, wire brush machines and accessories.

CP grinders range from small wheel grinders and die grinders to the heavy-duty 4" to 8" "Steel-Clad" grinders. All types can be furnished with extension spindles, and there is a choice of straight, pistol grip and lever type handles.

The Bulletin also shows a variety of such special purpose tools as reciprocating files, rod grinders, and external tube end polishers. Write for your copy today.



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tended for convenient hitching or collapsed so as to be out of the way when the table is being loaded.

#### Straightening Press for Iron Castings

To simplify the straightening of iron castings, prior to machining, and to reduce distortion losses, the Dake Engine Co., 612 Seventh St., Grand Haven, Mich., has brought out the 50HE Elec-Draulic Press illustrated herewith. Equipped with



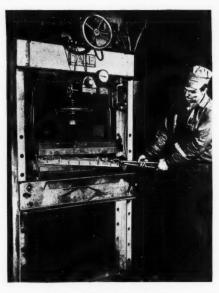


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Dake 50HE Elec-Draulic Press

special straightening dies in which distorted castings are placed immediately after their removal from the normalizing furnace, the press has a production capacity of 400 castings per day, averaging 1.6 minutes per casting. A quick-acting release valve lends speed to the straightening procedure.

Other noteworthy features of the press include an adjustable safety valve to protect against overload; variable-speed ram; movable workhead; eye-level height pressure gage; adjustable table; and auxiliary screw-type ram. Two auxiliary return springs assure rapid return of the upper half of the die.

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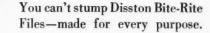
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#### Bench Type Grinders

The Clizbe Bros. Mfg. Co., Plymouth, Ind., announces the addition of two new type grinders, designated as the "Economy" and "Super," to its line of grinding equipment. The Economy is an all-purpose grinder which has long Oilite bronze bearings with an oil well around each. The arbor of the unit is 12 inches long and is % inch in diameter in the portion supported by bearings and % inch in diameter at each end. The arbor is equipped with a combination V-flat pulley which measures a total of  $2\frac{1}{2}$  inches in diameter.

Available with or without wheel guards, the Clizbe Economy Grinder is designed to handle wheels up to 7 inches in diameter x 1½-inch face and has a shipping weight of 9 pounds.

The Super is a heavy duty grinder which is designed to withstand hard usage and is provided with an arbor that is 15½ inches long and measures % inch in diameter in the portion supported by bearings and ¾ inch in diameter at the ends. The grinder is designed to accommodate wheels up to 8 inches in diameter x 1¼-inch face with ¾-inch arbor holes, and features two combination V-flat pulleys 3½ inches in diameter x 1½-inch

face. The loose pulley can be locked for double V-drive.

Constructed with Oilite bronze bearings





Clizbe "Super" Grinder

having an oil well around each, the Clizbe Super Grinder is available with or without wheel guards and has a shipping weight of 25 pounds.



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# Torit Dust Collectors, by capturing abrasive dusts, prevent damage to precision equipment and finished parts.

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#### Deep Throat Press

Identified as the No. OG, a 5-ton deep throat press has been added to the Rousselle line of deep throat, open back inclinable and adjustable bed horn presses manufactured by the Service Machine Co., 7633 S. Ashland Ave., Chicago 20, Ill. The press is available in both bench and floor models. The 12-inch throat al-



Rousselle No. OG Deep Throat Press

lows for working to the center of 24-inch sheets, thus making the press ideal for large, bulky work, as well as regular punch press operations, it is claimed by the manufacturer.

The frame of the Rouselle No. OG Deep Throat Press is an extra heavy semisteel casting which is heavily ribbed to provide for maximum rigidity and strength. The unusually large heavy duty clutch of the machine can be easily set for single-stroke or continuous operation and is arranged to function at a speed of 250 strokes per minute. In the floor model, the press weighs approximately 700 lb. complete with motor.

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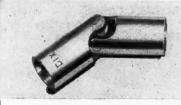
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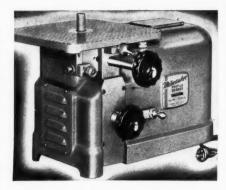
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#### Bench Type Profile Grinder

A bench type profile grinder designed primarily for the high speed precision grinding of internal and external contours, curved, odd and irregular surfaces has been added to its line of Milwaukee products by the Rice Pump and Machine Co., 1401 S. 40th St., Milwaukee 4, Wis. The machine is said to be especially adapted to the grinding of die clearances, sharpening of cutter dies and punches, grinding of cams, and finishing of hardened steel parts.

Features of the Milwaukee Bench Type



Milwaukee Bench Type Profile Grinder

Profile Grinder include a collet chuck which is claimed to permit easy removal and insertion of grinding wheels and provide for absolutely true running of wheels; built-in diamond wheel dresser which is always available to keep wheels sharp and true; compound tilting mechanism which tilts work table 30 degrees to the front and 15 degrees to the side and permits a wide range in grinding compound curves and angles; and vertical adjustment of 31/4 inches which allows for the using and dressing of mounted wheels up to this height. The two grinder models available—a standard and high speed model for mounted stone and high speed carbide wheels respectively-differ only in spindle speed.

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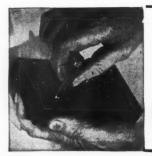
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its shearing machines in shearing wide or long plates and sheets on a volume basis. The attachment includes a remote control foot switch which can be placed at any position convenient to the shear operator so that the conventional full length clutch treadle can be tripped without the aid of an assistant.

If desired, the electric clutch control can be furnished with two foot switches and a selector for single or double operator control. With double operator control, both operators must actuate their foot switches before the clutch will trip, starting the shear.

#### Portable Grinder-Miller

Identified as the Super 40, a portable grinder-miller with a speed of 45,000 r.p.m. and a rating of over 1/5 h.p. is announced by the Precise Products Co., 1345 Clark St., Racine, Wis. Used with or without a flexible shaft attachment or in machine setups, the unit is claimed to operate mounted wheels up to 1¼ inches in diameter, unmounted wheels, cutoff wheels, and metal saws with special arbors up to 2 inches in diameter x ¼ inch wide using a speed control, and high speed midget mills and carbide micro mills up to % inch in diameter x 1 inch wide.

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available is said to adapt the Precise Super 40 to practically any tool or production setup in standard lathe, milling machine, drill press, or other stationary machine tool. Accessories include a "Coolflex" flexshaft extension, tool mount, universal mount, and a line of lathe stands with built-in speed controls and Magni-Ray units for standard and special applications such as wire stripping and mica undercutting. Used as a hand tool or with flexible shaft attachment, the Precise Super 40 is also said to produce mirror finishes on dies and parts using special diamond compounds.







Milling Hardened Die with Tungsten Carbide Mill and Precise Super 40 Grinder-Miller Mounted in Drill Press

Outstanding features of the unit include a precision machined aluminum alloy housing; micro precision ball bearings requiring no lubrication; rigid and accurate-operating quill and collet chuck; air-cooled motor which is protected from overload by easily replaceable Fusetrons is a complete unit with armature and field assembly in a self-contained cartridge that slips into the housing.

#### **Medium Duty Dust Collector**

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use VIKING Inserted Carbide Tools with exclusive Mechanical Lock!

With Viking's patented mechanical lock there is no brazing or thermal strain to cause costly, time-wasting cracking.

#### OTHER FEATURES:

VIBRATION-PROOF LOCK makes bit an integral part of holder. 
 FULL DEPTH OF CUT maintained throughout tool life. 
 3 DIRECTION ADVANCE of tool bit ... major advance in direction of feed ... assures long lived cutter and minimum removal for reconditioning. 
 "BUILT-IN" CHIP BREAKER—incorporated into holder ... eliminates "grinding in" ... replaceable chip breakers available for heavy duty machining. 
INTERCHANGEABLE BITS for all types of machining provided. 
QUICK TOOL CHANGING is made easy because holder need not be removed from machine.

WRITE FOR CATALOG 2-49





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accurate • dependable • economical

Simply move the flexible sleeve on the taper arbor and get thousands of variations for holes from  $\frac{1}{2}$ " to  $6\frac{1}{2}$ ". Sizes are 1 to 12 with large and small sleeves for sizes 6 to 12. Write for data sheet today. Dept. M.M.

The WESTERN Tool & Mfg. Co., Springfield, Ohio



middle size belt and disc sanders, the "Dustkop" Model 800 Dust Collector illustrated herewith has been added to the line of unit type industrial dust collectors offered by the Aget-Detroit Co., 314 Main at Washington, Ann Arbor, Michigan.

Except for size and capacity, the Model 800 is identical with previous Models 1150 and 420 in that it is entirely self-contained, portable, and may be installed



"Dustkop" Model 800 Dust Collector

without wall or floor cutting or duct work. The unit is said to develop a rated 746 c.f.m. at 8,000 f.p.m velocity with 3.7inch water lift and employs the same principle of operation as with its pred-ecessors. A paddle wheel self-clearing fan, direct driven by a continuous duty % h.p. 3,600 r.p.m. motor, creates the suction to remove the dust from the source. A cyclone separator, self-contained within the unit, removes the majority of the dust and dirt from the air stream, allowing only the extremely fine dusts to be trapped by the spun glass filter which forms the top of the unit and comprises a second stage cleaning for the air before it is recirculated to the working area to conserve heat.

Dust and dirt removed from the air stream in the cyclone are deposited in the removable drawer of the dust col-



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### PRECISION BROACHES

Manufacturers of standard and special broaches—broaching fixtures. A complete service for sharpening, reconditioning and converting broaches. Standard keyway broaches in stock.

Dependable, Prompt Service

Several territories open for representation.

## CONANT Tool & Engineering Co.

347 WEST 107TH STREET CHICAGO 28, ILLINOIS

34 Spindles in 6" Square



#### Look at this!

THIS head has been designed mainly for high speeds, although it is also used for large cluster boxes on way type machines.

Designed to eliminate oil seals and other rubbing parts, it is fully ball bearing equipped. It contains an oil pump with a built-in trouble-free vane type pump, which pumps the oil to the top of the head and by centrifugal force spreads the oil over the entire upper surface of the head, then cascades down over the bearings and gears.

over the bearings and gears.

Ideal for high speed sensitive drilling machines, its castings are made of high-grade aluminum alloy. All spindles and shafts are made of alloy steel properly heat-treated and ground.

IMMEDIATE DELIVERY!

We manufacture all types of multiple spindle, fixed center, adjustable and lead screw tapping heads.

UNITED STATES DRILL HEAD CO. CINCINNATI 4, OHIO

**SINCE 1915** 

lecting bin which forms the base of the unit. The fine dusts which are removed by the non-inflammable spun glass filter are quickly shaken out of the filter by a hand crank.

The compact design permits the unit to be installed immediately behind or close to the source of the dust. Inlets sized for connection with standard sheet metal pipe or flexible metal hose are optional as follows: single 6-inch, single 5-inch, and double 4-inch. Interconnection of the starting circuit of the dust collector with

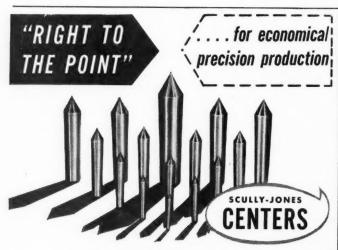
that of the dust creating equipment is recommended so that the dust collector and dust source are on and off simultaneously.

#### Hardening Compound

The hardening of drills, chisels, gouges, caulkers, reamers, dies, taps, and cutting tools of carbon or high speed steel to any desired depth in a matter of minutes is claimed to be possible

through the use of a compound known as "Hi-Speed-It" now being marketed by the Wilson Carbon Co., Inc., 60 E. 42nd St., New York 17. New York.

York 17, New York. According to the manufacturer, the compound contains no cyanide or other producers of toxic fumes and requires no special skill or special equipment to use. The object to be hardened is first heated to a cherry red color in an ordinary plumb-er's torch or an open forge or furnace and is then dipped, rolled, or stirred in the gray powder. A lapse of 15 to 30 seconds is allowed for the power to fuse and form a crust, after which the object is again dipped lightly in or sprinkled with Hi-Speed-It. The object is reheated cherry red and is then quickly quenched in clean cold water or brine. The depth of hardness is controlled simply by repeating the first four steps before quenching. High speed steels are processed similarly but at higher temperatures and are quenched in oil.



You get accuracy and long life from Scully-Jones Centers, because, in all sizes, they are ground to tinier-than-a-pin-point concentricity of .0002"—and are scientifically heat-treated.

Equip your machines now with these Scully-Jones Centers that will meet all your requirements: (1) Tungsten Carbide Tipped Centers (2) Stellite Tipped Centers (3) Solid High-Speed Steel, Plain and Half Centers (4) Carbon Steel Centers (5) Special Centers made to your requirements. Furnished with Morse, Jarno or Brown & Sharpe Tapers in all popular sizes.

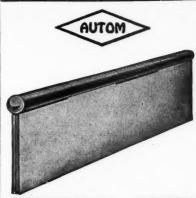
For complete information refer to pages 302-307 of Scully-Jones Tool Engineering Manual 500 and latest discount sheet.

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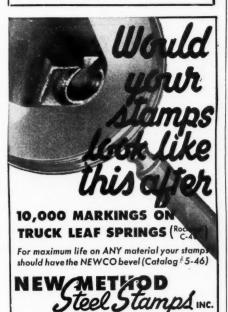
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Detroit 7, U. S. A.



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#### New Model



#### Multi-Wheel Numbering Machine

Machine and Shank All One Plece.

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

Bulletin MS-70.

#### AUTOMATIC INDENTING NUMBERING HEAD . MODEL 50

Automatic indenting numbering head for consecutive or repeat numbering, 1/32" up to \( \frac{\pi}{n} \) high figures can be furnished in sharp face Gothic or shaded Roman figures. Prefix or suffix letter wheels. Bench, foot, or power presses can be used. can be used. Numbers: ra-dio, airplane, tool parts. sturdy con-

struction and give uninter-rupted marking service.



NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y.

147 Jos. Campau



"Load Carrier" Junior Industrial Floor Truck

and is available in tilt, non-tilt, wagon, and dolly types. It can be furnished with 4-, 6-, and 8-inch diameter wheels of semisteel, aluminum, cushion rubber, hard rubber, and plastic. The truck is a companion model to the Market Forge Load Carrier and is designed to accommodate all the standardized accessories normally used on the Load Carrier, such as end racks, pipe stakes, box sections, shelves, leaf trucks, cradle units, rod and tube units, and are rounded edges and corners of

so on. The rounded edges and corners of the unit are said to provide for maximum safety to the operator and to the material handled.

#### **Industrial Floor Truck**

Known as the "Load Carrier Junior," an industrial floor truck which can be easily converted for many uses with available accessories is announced by the Market Forge Co., 25 Garvey St., Everett 49, Mass. The truck is 30 inches wide with 60-inch length of loading space between end racks. The overall length of the unit is 63% inches.

The Load Carrier Junior has a maximum capacity of 2,500 lb. distributed load

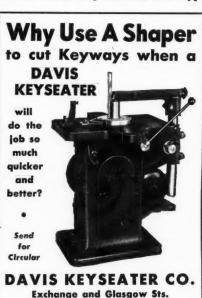
#### Bench Type Ductility Testing Machine

Steel City Testing Machines, Inc., 8843 Livernois Ave., Detroit 4, Mich., announces the development of a bench type

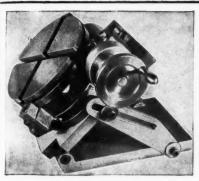


• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO. 96 Silliman Ave. Bridgeport 5, Conn.



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#### 5 IN. ROTARY TABLE ON ADJUSTABLE ANGLE PLATE

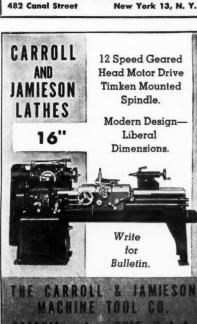
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SMALL and FINE CIRCULAR MACHINING CAN BE PURCHASED SEPARATELY

Accurate — Dependable

Write for Bulletin We Also Make Four Larger Sizes.

JOHN B. STEVENS INC.



#### THE New MODEL 1100 HYBCO TAP GRINDER

ACCURATELY GRINDS CHAMFERS OF TAPS, CORE DRILLS

SHARPENS FLUTES, SPIRAL POINTS of TAPS



- Capacities No. 2 Mach. Screw to 1½" Hand Taps.
- All Settings Adjustable To Give Any Angle—Relief—Hook.
- Taps Held in Precision Collets Can Be Sharpened After Center is Destroyed.
- Standard Motor Any Current Specification.

Representatives In Principal Cities

#### Henry P. Boggis & Co.

1277 West 3rd Street Cleveland 13, Ohio ductility testing machine for testing the drawing qualities of sheet metal. The machine is compactly made (2 feet 11 inches in height and 26 inches across) and has an unusually fast cycle.

The speed of piston travel is adjustable within a wide range by means of a simple dial setting. Complete tests in as little as 15 seconds are said to be possible. The machine is available with a capacity of 15,000 lb. to cup test material up to ½ inch thick or 30,000 lb. for material up to ½ inch thick.

teral up to ½ inch thick.

Motorized and hydraulically operated,
the Steel City Bench Type Ductility Test-

# Reduce Set Up Time Specify SEIBERT Adapters

#### The Standard of Comparison



Precision Adapter Assemblies. Morse Taper, Stub Taper and Extension Adapters.

#### Also manufacturers of:

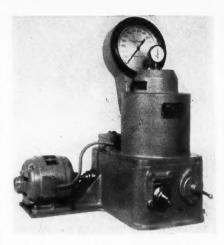
Arms, Standard Slip and Bracket Type Spindles, Lower Drives, Pinion Drive Shafts, etc. Prompt Delivery.

Write for Catalog



Manufactured by

Seibert & Sons, Inc. East Peoria 8, III.



Steel City Bench Type Ductility Testing
Machine

ing Machine incorporates two concentric pistons. The outer piston grips the test piece against the head at the top of the machine, while the inner piston makes the cup in the specimen. An 8½-inch diameter pressure gage, fully protected against overloading, incorporates a maximum indicating hand to show the pressure at which yield in the specimen occurs. A depth indicator shows the depth of draw at any moment by direct reading.

#### Vertical Plate Bending Roll

To augment its line of horizontal rolls, the Webb Corp., Webb City, Mo., has added a vertical plate bending roll of the type illustrated herewith, which is de-

## NO BUSHINGS, GUIDES or PILOTS NEEDED!

#### THE READING BROACH KEYSEATER

The Reading Bench Machine requires no bushings, guides or pilots. No other machine like it. Very fast—capacity from 1/8 to % cutter.

Low first cost—prompt delivery.

READING MACHINE COMPANY, Reading (Cincinnati), Ohio



#### "OLIVER"

No. 232-D TILTING ARBOR

#### SAW BENCH



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machine . . .
ideal for
pattern

shops

Quickly adjustable for ripping, cross-cutting, dadoing, ctc. Table remains level while saw tilts up to 45°. Table and gauges accurately graduated. Write for Bulletin No. 232-D.

"Oliver" makes a complete line of equipment for pattern shops

#### **OLIVER MACHINERY COMPANY**

GRAND RAPIDS 2, MICH.

### **GEARS**

#### **Small and Medium**

SPURS (internal and external)

HELICALS

STRAIGHT BEVELS

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GEARS THREAD

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COMPLETE GEAR TRAINS

Send us your blueprints for estimate

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GEAR WORKS, Inc. 1022 Parmelee St., ROCKFORD, ILL.

BEND PIPE

BY HAND OF MOTOR

MACHINES TO BEND COLD PIPE, CONDUIT, BOILER TUBING

AND SOLID BAR . . . BENDING TABLES ALSO AVAILABLE



Above: Hand-powered Type A-30 . . . up to 180° bends . . . all sizes from ½" to 2". Only 7 parts. World's fastest, simplest machine. Note assortment of bending dies . . this process makes shorter tangents than any other. Occupies only 18" x 18" floor spacel

#### Other Sizes Available

Factory and Main Office: 14 Furnace St., Poultney, Vermont



Above: Motor-powered Type E . . . bends fixed radii at 6 to 1 up to 90°. Type E bends 2½", 3", 3½" and 4" pipe. 3 horse-power motor. Floor space accupied—7' 6" x" 7' 6". Other power machines up to 8" capacity.

PIPE BENDING MACHINE COMPANY-INC.



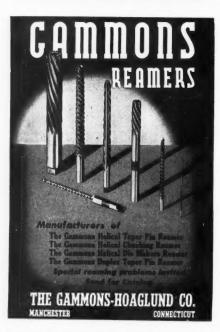
#### SAVE WEIGHT - SPACE - COST

Short stubby jaws allow the Atlas to be used in applications where space is limited or where light weight is essential. Bearing loads held to absolute minimum by large bearings OF EQUAL SIZE located at maximum distance from center of joint. For full details write Dept. B.

GRAY & PRIOR

Makers of Atlas and Vulcan Universal Joints

THE GRAY & PRIOR MACHINE CO., HARTFORD 5, CONN. In the West Link Belt Co. Los Angeles, San Francisco, Portland, Seattle Oakland, Sankane



signed for use in rolling large diameter cylinders of light plate where true diameters must be held during the bending process.

The sheet, which is handled with a jib crane, is inserted on edge into the machine. As the sheet is ejected from the rollers, it is said to maintain a true diam-



Webb Vertical Plate Bending Roll

eter due to the fact that horizontal stress on the rolled plate is reduced to a minimum.

#### Universal Cutter and Tool Grinder

Designated as the Grand Rapids No. 10. a cabinet base type universal cutter and tool grinder described as an ideal unit for the small shop with limited requirements or for the large manufacturing plant where batteries of machines of this type are required has been announced by the Gallmeyer & Livingston Co., 308 Straight Ave., S. W., Grand Rapids 4, Michigan. A handwheel located at the top of the machine is used to raise and lower the column and head. Longitudinal movement of the saddle may be effected by either a handwheel or lever located on the front of the machine or by a lever at the rear of the machine. Cross movement of the saddle can be effected from practically any desired position by means of

#### Only ERRINGTON Adjustable TAPPING HEAD Offers So Many Advantages



Fully geared
Needle bearings on all spindles in head

Ball thrust bearings through-

**Bronze** bushed

Sand cast aluminum case All parts fully enclosed for pressure lubrication and pro-

Non-slip Non-slip positive clamping on all adjusting members

> Here's a versatile tool which permits you to take advantage of a wide range of adjustment — without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Write for Complete Information

**ERRINGTON Mechanical Laboratory, Inc.** Main Office and Plant: Staten Island 4, N. Y.

### GIBBONS Hydraulic Presses

Designed for precision operations to give you peak production at lowest costs.

Backed by years of experience in pressroom operations. Write today for complete data on GIBBONS Hydraulic Presses, stating requirements.

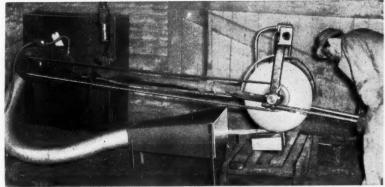
Here is a GIBBONS HYDRAULIC PRESS tooled especially for tube bending operations

GIBBONS Machine Co.

501 North Fifth Street, Tipp City, Ohio

#### USTS

Model 1150 (below) is only one of a complete line (250 to 3600 cfm)



AGET-DETROIT CO. 207 Main at Washington ANN ARBOR, MICH.

Phone 2-5585 for **Rush Shipment** From Stock

WITH

a handwheel located on the front of the machine or a handwheel situated on the rear of the machine. Dials graduated in thousandths of an inch are provided for both vertical and transverse movements.

The grinding head of the No. 10 may be swiveled through 180 degrees and instantly locked at any desired setting. The table may be swiveled to 90 degrees either side of center to provide any desired relation between the table and the grinding wheel spindle. The grease-sealed precision ball bearing spindle is said to require no lubrication for the life of the bearings and is driven through a V-belt

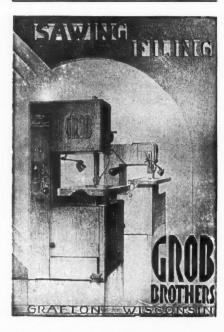


### M - D Facing Heads

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO.
120 PHILADELPHIA ST. HANOVER, PA.





Grand Rapids No. 10 Universal Cutter and Tool Grinder

by a  $\frac{1}{2}$  h.p. ball bearing motor mounted on the head of the machine. Two spindle speeds are provided.

The table size of the Grand Rapids No. 10 Universal Cutter and Tool Grinder is 5 x 30 inches; longitudinal table movement, 16 inches; cross movement of the grinding wheel, 8 inches; and vertical movement of the spindle, 8 inches.

#### Special Abrasive Compound

The United States Products Co., 518 Melwood St., Pittsburgh 13, Pa., has developed an abrasive compound specifically for use in grinding and lapping-in



3 SIZES - 4 MODELS - 6" to 12"
TROYKE MFG. CO.
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#### DRILL and PILOT BUSHINGS Frictionless

—Rotary
For core drilling, T.
C. and h i g h speed boring, turret tool, piloting, etc. Won't stick or clog. Dust

proof as a watch. Write for details.

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1300 Mt. Elliott Ave.

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METAL LATHERS' BENDER

This machine will bend up to 1/2" square or round iron, 2" x 1/2" channel iron, 21/4" x 5/16" flat iron cold Weight 40 lbs.

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successfully operate completely submerged in water. · You'll welcome their low cost. . No metal reinforcements required. . Save Time . . . Money . . . Labor! We also make silent gears of rawhide and Fabroil.

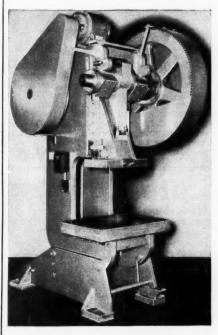
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### HEIDRICH

### Welded Steel **Punch Presses**



The Heidrich inclinable and horning presses include a sturdy welded steel frame and are equipped with a non-repeat single trip mech-

Crankshaft bearings are split at 45° angle directing entire thrust to the frame. The extra deep throat and large bolster plate provides mere space and clamping for a larger die. Flywheels are provided with three points of en-gagements, hardened tool steel locking pins giving quick action and are very easy to replace.

The slides on Heidrich presses have V-shaped gibs of ample width and length also provided with extra flanges to assure ample support for dies.

Write for complete details.

HEIDRICH ENGR. & MFG.. INC.

23550 Park Ave.,

Dearborn, Mich.

brass or bronze tapered plug or key cock valves. The compound is made with a water soluble base of special formula that is said to have excellent lubricating and carrying qualities. Parts finished with the compound can be washed in ordinary water.

The compound is made in the following grades: No. 17, coarse; No. 18, medium: and No. 19, fine.

#### Grinder-Buffer

The Baldor Electric Co., 4380 Duncan Ave., St. Louis 10, Mo., announces the development of a bench type grinder-buffer designated as the 60 Series. The unit is powered with a ¼ h.p., 3,400 r.p.m., capacitor start, capacitor run motor which, according to the manufacturer. will not burn out even though subjected repeatedly to overloads.

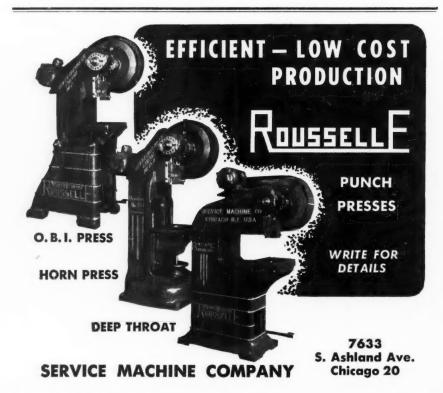
Standard equipment of the Baldor 60

Series Grinder-Buffer includes a 6-inch grinding wheel on the left-hand side and a 6-inch wire brush on the right-hand



Baldor 60 Series Grinder-Buffer

side. Ball bearings used are of the sealedfor-life type which requires no lubrication.





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# CASE HARDENING COMPOUNDS

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TOOLS Machinery Equipment

"A POUND OF WEAR PREVENTION"

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#### KASENIT COMPANY, BOX D

799 GREENWICH ST. NEW YORK 14, N. Y.

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Broken Tool
REMOVER



Only \$95

• It's sensational — Every shop, every tool crib should have one. Removes broken tools and studs by electrical disintegration from a part being machined without damaging the part. Saves castings otherwise scrapped. Set it up on your drill press.

See Your Dealer or Write Us Today.

ELOX

748 N. Rochester Road Clawson, Michigan, U.S.A. Phone, Detroit: Jordan 4-6173

### It doesn't pay to PINCH PENNIES



### CUTTING FLUIDS

IN selecting cutting fluids, savings pinched out in purchasing are often thrown out in the scrap pile. A Milwaukee screw products company learned this machining Type 304 stainless. Of several cutting fluids tried, D. A. Stuart's ThredKut 99 with paraffin oil was the only one which enabled the shop to produce this job at a profit. On the forming operation, ThredKut 99 gave 500 to 600 pieces per grind, as compared to only 100 to 135 with other oils; on drilling 300 to 400 pieces with Thredkut 99, only 75 to 100 with other oils; and 22 pieces per hour average with ThredKut, only 8 with other oils!

It is wise economy to buy the oil best suited for the job. Write for booklet, Cutting Fluids for Better Machining.

STUART service goes with every barrel



27411/2 South Troy Street, Chicago 23, III.

#### ALMOND DRILL CHUCKS



Maximum Gripping Power with
Extreme Accuracy and
Long Life.
Write for Catalog.

T. R. Almond Mfg. Co.
Ashburnham, Mass.
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#### **USE ECONOMY**

Headless Set Scrows Socket Set Screws





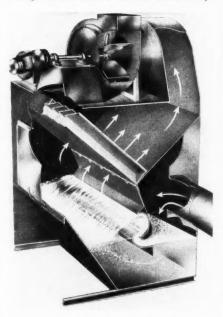
Try Them On Your Next Job!

# MACHINE PRODUCTS COMPANY

5212 Lawrence Ave., Chicago 30, III.

**Hydrostatic Precipitator** 

The American Air Filter Co., Inc., 100 Central Ave., Louisville 8, Ky., announces that its AAF Type N "Roto-Clone," used for the collection and control of dust generated in manufacturing and process operations, has been redesigned to provide for wider application and improved performance. Identified as Design 2, the unit is described as a hy-



Cutaway View of AAF Design 2 Type N "Roto-Clone" Hydrostatic Precipitator with Flat Bottom Design for Manual Removal of Collected Material

drostatic precipitator that cleans the air by the combined action of centrifugal force and a thorough intermixing of water and dust-laden air, reusing the water without pumps or spray nozzles.

According to the manufacturer, the AAF Design 2 Type N Roto-Clone, with capacities through 48,000 c.f.m., maintains a lower pressure drop with the same cleaning efficiency and water recirculation rate as heretofore and can be operated from 50 to 120 per cent of its normal rating without affecting its collecting efficiency. All sizes are available in either manual cleanout, sludge ejector or hopper bottom arrangement.

# Lapping Compound that cuts Hardened Steel twice as fast as ordinary compounds......



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TIMECUTTER is compounded with a new formula that speeds up your lapping-in process three ways.

This pre-mixed, ready-to-use compound cuts twice as fast... clings to the points of contact and really grinds to a fine finish... then, the silicon carbide washes off in a sludge, quickly and easily.

Write for full information about three-way improved TIMECUTTER

TIMESAVER PRODUCTS CO. 346 W. Washington Blvd. CHICAGO &, ILLINOIS



CLINGS

to points of contact

WASHES OFF





THE SAMSON AUTOMATIC CLUTCH PULLEY

A clutch while starting

A pulley when driving

Fully reversible; compact; adaptable to single or multiple vee belt drives.

An efficient variable - width sheave operated by centrifugal force. Engagement speeds are pre-set to your specifications within limits of 750 to 3500 R.P. M.

For further Information

Write to

THE SAMSON MANUFACTURING CO.

AUTOMATIC CLUTCH DIVISION

Mfg. of Samson Hydraulic Hoists

P. O. BOX 682 2617 Tulare St. Fresno



### Top Rim STEEL STACKING BOXES

18" x 12" x 6". 16 Ga. with Drop Handles

#### STANDARD SIZES

16 x 10 x 6.....18 Ga. 16 x 10 x 6.....16 Ga. 18 x 12 x 6.....16 Ga. 18 x 12 x 8.....16 Ga.

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#### WE MANUFACTURE ALL TYPES OF STEEL BOXES

We make a specialty of boxes made to fit your particular handling requirements. Special boxes designed so they can be run thru with standards enable us to quote prices comparable with that of a standard box.

STERLING FACTORY EQUIPMENT CO

183 CHARLES ST. PROVIDENCE, R. L.

#### Cutter Grinding Fixture

A cutter grinding fixture which is designed to handle a multitude of precision grinding jobs has been announced by the Madison Mfg. Co., Dept. MM, Muskegon, Mich. Originally designed to facilitate the regrinding of Madison cutters, the fixture has been modified to accommodate a variety of run-of-the-shop grinding jobs. The manufacturer states that the fixture has been successfully used in grinding cutting edges, steps, flutes and chip relief on Madison roughing and reaming cutters, milling cutters, chamfering tools, turning tools and reamers.

#### ARTUS ARBOR SPACERS



#### The COLOR tells the THICKNESS

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glancel .001, .0015, .002, .003, .005, .0075, .010-030. Speed up accurate fitting at low cost. Write for folder.

#### CONVENIENT TRIAL OFFER **Handy Spacer Assortment**

10 eg. .001 - .0125 thick .015 - .030 thick 5 ea.

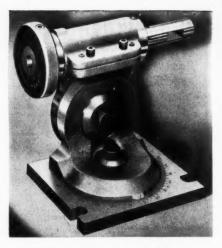
#### 100 SPACERS IN ALL

11/4" -\$3.10 \$3.80 11/2" 3.35 4.70

Other standard sizes also available.

Illustrated Folder Free. Immediate Delivery on Spacers, Gaskets, Shims, Large Slitting Saw Spacers.

**Industrial Products Suppliers** Dept. M, 434 Broadway, New York 13, N. Y.



Madison Cutter Grinding Fixture

The Madison Grinding Fixture is graduated in degrees in all three planes and offers automatic indexing for Madison and any other tools where 180-degree in-dexing is required. The automatic index feature can be released for conventional handling of other types of tools. Arbors for all sizes of Madison cutters (both roughing and reaming), for single point tools, and for milling cutters are available. Special arbors may be obtained if needed. A wooden box to hold the fixture and up to eight arbors is also available.

#### Double Reduction Speed Reducers

By using standard speed reducers as primaries and secondaries, a line of double reduction units comprising over

#### STANDARD CARBIDE BLADES

Milling Cutter Bodies

Check These Advantages: Carbon Tool Steel Shank

Oversize Tip-Diamond Lapped Flush With Top of Shank

For All Types of

Lower Cost Stock Delivery Guaranteed Workmanship



10° Relief Angles Preformed On Tip and Shank Blade Number and Grade Visible
After Blade Is Assembled in Body

We Fabricate All Types of Carbide Tools. Write for Bulletin No. 101 or Send Print or Sample for Quotation. Distributor Inquiries Invited.

WISCONSIN CARBIDE TOOL CO., 3345 N. 35th St., Milwaukee 10, Wis.

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Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the

ideal means of winding extension, compresided means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$1.50

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HJORTH LATHE & TOOL CO.

WOBURN, MASS. 10 BEACON STREET

#### TWISTITE QUICK- CLAMPS



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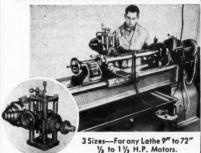
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Have push-pull action for instant clamping. Safety clutch and ballbearing foot prevent frame damage. The perfect clamp for welding-spatter can't stick to smooth pressure rod. Write for informa-

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24 Leonard St., N. W., Grand Rapids 5, Mich.

#### **KEYWAYS A Foot A Minute** With A MASTER CONVERTER



Capacity: 1 Cu. In. Metal Per Min. Per H.P.

#### BASIC MILLER and 7 Interchangeable HEADS THE MASTER LATHE CONVERTER

The world's most versatile auxiliary machine tool. Result of 14 years of designing, engineering and building multi-purpose milling and grinding attachments. Also does internal keyseating, drilling, reaming, boring, thread milling and hundreds of other metal working jobs. Maximum Performance, Minimum Cost. Write for Descriptive Literature.

MASTER MANUFACTURING CO. 1302 East Avenue "A" Hutchinson, Kan.



LYON MACHINE WORCESTER 3, MASS.

Our Engineering Department will welcome the opportunity of discussing any grooving problem without obligation. 86,000 combinations as to capacity, model and ratio has been made available by the Cone-Drive Division, Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The combination of standard reducers provides mbdels with input ratings of from ½ to 68 h.p., from 4,000 to 244,000 inch-pounds, output torque, and reduction rates of from 25-to-1 to 4900-to-1. Standard ratios for primary and secondary reducers can be combined in a number of ways according to operating requirements to provide the same overall ratio. Similarly, the size of primary or secondary reducer can be varied to suit

the specific operating conditions.

The only major differences between the standard reducers used in the double reduction units and those supplied for single reduction purposes is that primary gear shafts and secondary pinion shafts are slightly shorter. An adapter plate and flexible coupling connect the two reducers. A special housing is also used for the smallest of the primary reducers. Otherwise, all parts are standard.

Individual primary and secondary reducers are interchangeable and separately replaceable within given size ranges and may be dismounted and

quickly converted to single reduction units if desired, since each component retains its independent lubricant supply and breather. The use of standard gear sets also makes it simple to change the ratio of any combination where and if desired since all gear sets and bearing mountings a re interchangeable for all models of the same size, facilitating maintenance replacement.

Although the line provides some 86,-000 possible combinations, there are actually only 5 sizes of primary reducers and 8 sizes of secondaries. Two of the primaries (21/2 and 3-inch center distance) can be combined with four of the secondaries (4 to 7inch center distance). The three other primaries (4, 5, and 6-inch center distance) go with the other four secondaries (7 to 12inch center distance).

Other features of the reducers include high speed metallic oil seals where the seal is

#### YESTERDAY'S PIONEER . . . TODAY'S LEADER



(Die Sinking Cutters)

• The extensive line of the well known Weldon End Mills includes Tapered End Mills, Constant Spiral. Also known as Die Sinking Cutters these end mills, filling a definite need, come in a wide range of sizes, giving a choice of many lengths and diameters. Weldon Tapered End Mills as standard stock items are all 3-flute, and offer a choice of ½°, 1°, 2°, 3°, 5° and 7° angles. They represent the same high quality for which all Weldon End Mills are famous.

Write for Folder TM-1 giving complete list of sizes



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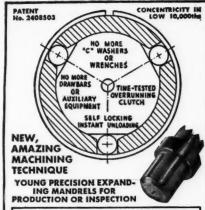
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Use these PRACTICAL,
UNIVERSAL Tool
Holders for ALL
your Lathe,
Planer and
S h a p e r
Set - ups.

Ideal for Carbide Tools

ELK TOOLS, INC.

71 W. Broadway New York 7, N. Y.



Curtiss-Wright Corporation ranks our product with their best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

ROUGHLY SKETCH DESIRED MANDREL INTO YOUR PART PRINT AND FORWARD FOR QUOTES.

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### The Hossfeld Universal Pipe Bar and Angle Iron Bender

Here is an indispensable tool for factory maintenance and many production jobs. Bends pipe, tubing, bars and angle iron flange inward and outward. Write for details today.



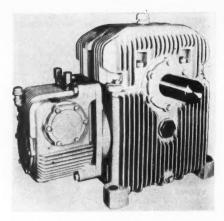
Patented in U.S.A. and Canada

HOSSFELD MANUFACTURING CO.

Winona

MS-5

Minnesota



Typical Cone-Drive Double Reduction Speed Reducer Obtained by Using Standard Cone-Drive 4-Inch Center Distance HV Reducer as Primary Combined with Standard 8-Inch HU Reducer Used as Secondary

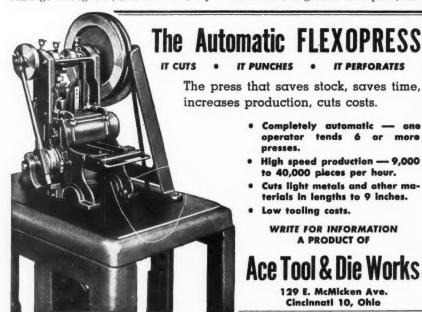
immersed in oil; provision for water cooling if required in the secondary units of the larger sizes; oversize anti-friction. bearings throughout; and chill-cast, cop-

per-nickel-tin-bronze gears and high carbon chrome - molybdenum - nickel - steel heat treated pinions. All types are available in both left and right-hand assem-

#### Universal Internal Chucker

Designed primarily for the second opertion chucking of parts where the bore and one face have been previously machined true with each other, the Speedgrip Universal Internal Chucker shown in the accompanying illustration is now being marketed by Speedgrip Chuck, Inc., 1102 W. Beardsley Ave., Elkhart, Ind. The vise is intended for use on turret lathes, automatic chucking machines, engine lathes, and multiple spindle boring machines, as well as on grinders, milling machines, gear shapers and hobbers, jig borers, and so on.

The Speedgrip Universal Internal Chucker is made in six sizes for accommodating workpieces with bores ranging from ½ to 11 inches in diameter. The major component parts of the unit consist of a semi-steel spindle adapter, a hardened and ground nose plate, an ex-



 Completely automatic — one operator tends 6 or more presses.

High speed production - 9,000 to 40,000 pieces per hour.

Cuts light metals and other materials in lengths to 9 inches.

Low tooling costs.

WRITE FOR INFORMATION A PRODUCT OF

### Ace Tool & Die Works

129 E. McMicken Ave. Cincinnati 10, Ohio

#### The New "UTILITY"

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#### MARKING OUTFIT

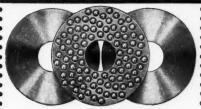
Nine sizes of type stamped with the same holder—furnished in sturdy wooden box—for all interchangeable marking.

Write for Literature.



158 E. Carson St., Pittsburgh, Pa.

#### **GWILLIAM**



TYPE TC-FLAT RACES

#### BALL THRUST BEARINGS

STANDARD SIZES OR SPECIAL DESIGN to your specifications. Our complete catalog will help you in making selection of bearings—shall we send it? Also ask for illustrated literature on Gwilliam ball thrust and roller thrust bearings.

"Serving Industry For 37 Years"

THE GWILLIAM COMPANY
358 Furman St. Brooklyn 2, N.Y.

### HI-LO



VARIABLE SPEED PULLEYS

• Hi-Lo Variable Speed Pulleys give infinite variable speed on any constant speed motor. Using standard V-belts, they maintain constant speed at any set point, no matter how the load varies and automatically regulate belt tension to the load. This is accomplished by a cam action within the Pulley, eliminating heavy springs and prolonging belt life. Hi-Lo Pulleys can be conveniently installed on machines already in service or incorporated into new ones. Furnished from fractional up to 5 HP, they will give a thousand speeds with any constant speed motor.

### EQUIPMENT ENGINEERING CO.

2853 COLUMBUS AVE. SO.

MINNEAPOLIS 7, MINN.

SEND FOR COMPLETE CATALOG

pansible bushing, and a hardened draw screw. The chuck can be actuated by means of an air cylinder, drawback or pushout collet mechanism, or manually.

According to the manufacturer, the Speedgrip Universal Internal Chucker is precision built and will produce parts that are parallel and concentric within 0.0002 inch. A change from one job to another can be readily effected by simply changing from one size of expansible bushing to another and, in some instances, from one parallel work spacing ring to another. Four screws in the out-

Speedgrip Universal Internal Chucker in Use

### **EQUI-GRIP**Basic Holding Fixtures



On your next production job remember EQUI-GRIP can cut your

#### TOOLING COSTS • PRODUCTION TIME SCRAP LOSSES

It will do scores of production jobs better, faster, and at a fraction of the cost of specially designed fixtures. Quantity repeat orders for EQUI-GRIP prove this.

Be sure our literature is in your files.

GEORGE-ANDERLE MFG. CO.

2524 Elsmere Ave. Dayton 6, Ohio

side diameter of the spindle adapter enable the nose plate to be adjusted with extreme accuracy, after which the chuck can be removed from the spindle and replaced many times without the need for readjusting.

Parts may be chucked lightly or with great pressure, depending upon the nature of the work. Thin walled parts can be machined without distortion, it is claimed. As the expansible bushing is drawn back over the tapered nose, it not only expands to grip the bore of the work but, at the same time, draws the work back to an accurate stop to ensure that the two faces are parallel. Sufficient pressure is said to be exerted by the expansible bushing alone to drive most work, however, in addition to this, a powerful drive is produced by the pressure of the work against the face of the nose plate, work spacing parallels, or rings.

### WALTHAM SUB-PRESSES ... for precision work



Babbitt bearing is tapered on outside and can be forced downwards. This reduces inside diameter to fit plunger when latter becomes worn through use. Exact alignment and constant precision can be maintained throughout life of die. Made in 9 sizes.

Write for further information.

WALTHAM MACHINE WORKS, INC.



WALTHAM, MASS.



### Spiral Flute

Aero Spiral flute HSS Co-sinks end chatter, cut clean and accurately. Stocked in 60, 82, 90, 100 degree included angle, ½", ½" diameter, with ½" shank and ½", and 1" dia. with ½" shank. If not available from your Mill Supply degler order direct.

AERO TOOL COMPANY
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#### MARK IRON, Steel and Carbides





Original Electric Etcher. Thousands in Daily Use

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements.

Write for circulars and prices.

#### BREWSTER-SQUIRES CO.

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Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

Let us have your inquiries.

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- · INTERNAL
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- CRUSH FORM
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Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

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Makers of Standardized Jig & Fixture Bushings
212 N. LAFLIN ST., CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

#### Color Filling Machine

Designated as the Acroprinter No. 301, a machine for applying color enamel filling into stamped, embossed, molded,



Acroprinter No. 301 Color Filling Machine

cast, and die cast parts has been developed by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Parts to be color filled may have flat, curved, concave, or convex surfaces.

Using a hand-operated mechanical mechanism, the enamel is carried from a platen shaped to match the surface being filled by means of a synthetic rubber die that is molded in a metal die to exactly match the design. Allowance for flow as the enamel is applied is provided in the die. In addition, adjustment for depth of application is provided to ensure efficient results when the machine is operated by unskilled workers.

ti

#### Flexible Shaft Fractional Horsepower Motor

Availability of a flexible shaft fractional horsepower motor for use with a complete assortment of precision hand tools in the jewelry industry has been announced by the L & R Mfg. Co., 577 Elm St., Arlington, N. J. The motor is a 1/12 h.p., smooth running, ball bearing unit with foot rheostat control and is designed for use with any flexible shaft attachment. An overhead hanging type with 15 feet of heavy duty S. J. cord of one-piece construction with molded junction, the motor has a speed range of up to 10,000 r.p.m. with a five-step speed control. The ball bearings of the unit are double-



#### A BETTER BORING BAI

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from ¼' up to and including ¾'.

THE DETROIT BORING BAR CO.
688 E. FORT ST. Detroit 26, Mich.



1927

#### TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide



"P" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately toclose limits. Can be expanded and reground giving long life. Sizes ½" dia. up to 6".



"('')' A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.





shielded and prelubricated and are said to require no attention.

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A complete line of Speedo tools is available for use with the L & R Fractional Horsepower Motor, including all types of flexible shaft attachments and handpieces for performing polishing, buffing, filing, burring, drilling, beveling,



L & R Flexible Shaft Fractional Horsepower Motor Equipped with Cord Set and Rheostat Control

slotting, engraving, honing, grinding, piercing, routing, hammering, riveting, setting, or peening operations.

#### Fixed Center Oil Circulating Head

Product of the United States Drill Head Co., Cincinnati 4, Ohio, the U. S. Fixed Center Oil Circulating Head illustrated herewith is designed mainly for high speeds, although it can also be used for large cluster boxes on way type machines. According to the manufacturer, the 34 spindles in the 6-inch square head can be operated at speeds up to 10,000 r.p.m. with very little heat.

Designed to eliminate oil seals and other rubbing parts, the head is fully ball bearing equipped. Idler shafts are mounted on ball bearings at each end of



the shaft. The ball bearings used on the spindles are of the angular contact type to hold the runout at the end of the tool to a minimum, and are also said to have

high tool thrust capacity.

The head contains an oil pump of built-in trouble-free vane type design which pumps the oil to the top of the head where, by centrifugal force, it spreads over the entire upper surface and then cascades down over the bearings and gears. Said to be ideal for high speed sensitive drilling machines, the head has castings which are made of high-grade aluminum alloy. All spindles

### GILMORE DIAMOND BORING TOOLS



F. F. GILMORE CO. 285 Columbus Ave.
Diamond-Boring, Turning, Facing, Engraving,
Truing Tools, Styli, Gage Contacts.



a

U. S. Fixed Center Oil Circulating Head

and shafts of the head are made of alloy steel, which is properly heat treated and ground.

#### **Cutting Oil**

Designated as Excel No. 60, an improved, high sulphur ester cutting oil which is said to be stable under all operating conditions involving the various machining of stainless steel (all series), as well as chrome-nickel alloys and Monel, is now being marketed by the Oil Products Co., Inc., 4115 S. La Salle St., Chicago 9, Ill. According to the manufacturer, the cutting oil provides for the production of high quality finishes within close limits employing unusually high speeds and feeds. In addition, long tool life is said to be assured through the use of the oil.

#### **MILWAUKEE PRECISION EQUIPMENT**

Surface plates, angles, and parallels can save you both time and money. They simplify measurement checking and facilitate layout and setups. Write for your free catalog today! There is no obligation.

#### J. C. BUSCH COMPANY

Engineers and Machinists Since 1907

126 E. Pittsburgh Ave.

Milwaukee 4, Wisconsin



#### **Expanding Mandrel**

Made for use on shapers, planers, grinders, lathes, and milling machines, an expanding mandrel having keys that are designed to hold work firmly and accurately so as to permit heavy cuts to be taken without chatter or distortion is now being marketed by the W. G. Le-Count Tool Works, South Norwalk, Conn. Available in sizes from \% to 7 inches, the mandrel is hardened and ground and is said to operate with 0.0005 inch at normal speeds.

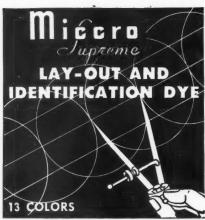
A coil spring included in the design of the mandrel provides tension on the keys so as to keep them in their grooves whether expanding or contracting. A dog



Drawing of LeCount Expanding Mandrel

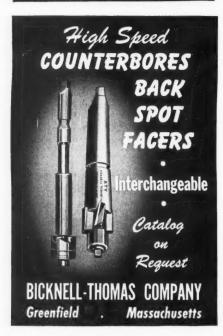
point set screw prevents the keys from sliding off the shank. The set screw is in two parts; the upper portion when tightened on the lower portion locks the screw. Removal of the dog point from its groove releases the keys and permits the key assembly to be removed from the tool by sliding off the tapered shank.





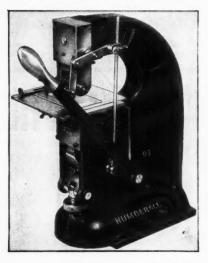
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief-dries instantly . . . Write for trial sample and circular.

MICHIGAN CHROME & CHEMICAL COMPANY 6340 E. Jefferson Ave. . Detroit 7, Mich.



#### Bench Hand Toggle Press

Identified as the Model 93, a bench hand toggle press for numbering, marking, and stamping operations is now being marketed by the Numberall Stamp & Tool Co., Dept. No. 93-12, Huguenot Park, Staten Island 12, N. Y. The press is principally made for use with the Numberall Model No. 50 automatic numbering head for consecutive numbering. Non-automatic numbering heads and typeholders



Numberall Model 93 Bench Hand Toggle Press

with steel type can also be used in the press.

Designed to stamp serial numbers on name plates, and so on, the Numberall Model 93 Bench Hand Toggle Press is claimed to exert a pressure of up to 10 tons. The head space is adjustable.

#### Improved Grease Absorbent

An improved "Sol-Speedi-Dri" Grease Absorbent which is claimed to absorb floor greases and oils more readily than its predecessor is now being marketed by the Safety & Maintenance Co., Inc., Suite 1218, 1 Wall St., New York, N. Y. According to the manufacturer, the compound is more absorbent, makes larger areas of slippery floor safe because it is fluffier, and has 10 per cent greater bulk per pound than the previous product.

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#### Step-Up Handpiece

Designed for use with any Wyco flexible shaft machine (except Junior and Wycoflex models), the Wyco No. 1300 Step-Up Handpiece illustrated herewith has been placed on the market by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. By replacing the standard handpiece or angle head with the step-up handpiece, the speed of the equipment is claimed to be increased three times. For example, on standard 3,600 r.p.m. single speed Wyco flexible shafts or machines, the operator can use small diameter rotary files, mounted grinding wheels, or abrasive sanders at



Wyco No. 1300 Step-Up Handpiece

speeds of over 10,000 r.p.m., it is claimed. The Wyco No. 1300 Step-Up Handpiece is available in two sizes to fit the various Wyco flexible shafts. A special new Wyco machine having a constant speed of 11,000 r.p.m. is said to provide a speed of 33,000 r.p.m. when using the handpiece for carbide cutters with ¼ or ½-inch shanks.

### FLOOR SPACE REDUCED 50% IN ASSEMBLY PARTS STOREROOM

### Ohio Corporation Installs Rotabins, Cuts Labor Requirements in Half

Replacing old storage with modern equipment made possible important savings. Floor space was reduced from 1760 to 900 square feet; shelving height was reduced from 12 to 7 feet, without loss of storage capacity. Aisles were wider and better lighted. One man can now do the work instead of two.

Rotabins increase space utilization because every square foot of storage has aisle frontage when needed. Each tray rotates easily on ball-thrust bearings; will not sag or bind when fully or unequally loaded. These rotary units are flexible and may be combined with straight shelving as desired. A wide variety of tray and drawer arrangements are available to meet specific requirements.

Rotabins are made in many standard sizes to suit a wide variety of needs. Trays rotate around a heavy tubular steel stem secured to a solid circular metal base. Rotabins are durable, portable; require no bracing or fastening. Standard finish is olive green enamel, baked on.

Savings realized from the use of Rotabins can quickly pay for entire investment. Let F-G-M engineers help you plan most profitable layout. Write, phone or wire your requirements.

Send for illustrated Catalog No. 106-A.





### The FRICK-GALLAGHER MFG. CO.

Shelving—Parts Bins—Racks—Counters— Tables—Benches 405 SHUBERT BLDG. PHILADELPHIA 2, PA.

#### Adjustable Vernier Size Block

For use by the engineer, machinist, and inspector in speeding up the performance of close tolerance reading, checking, and setting operations, the Barr Instrument Co., Inc., 134-39 225th St., Springfield Gardens 13, N. Y., is offering an adjustable vernier size block which may be used as an adjustable gage block with range of from 0 to 6 inches and providing 5.850 combinations of 0.001-inch readings; direct reading planer gage; feeler, space, and surface gage; adjustable parallels; inside vernier calipers; square; jack and

## BUY DIRECT FROM FACTORY

Router Bits for wood or metal

1/8" - 3/32" shank Hoby Shop Rotary Tools

1/4" shank Rotary Tools and Countersinks

Mark Down 50% Discount

100,000 Tools in stock at all times.

**Immediate Delivery** 

Distributors Wanted • Open Territory

#### PATTERSON TOOL CO.

1307 E. Genesee

Saginaw, Mich.

height gage. According to the manufacturer, the unit may be used to set tool heights on planers and shapers; set stops and trips on machines, snap gages, dial indicators on comparators, and other instruments and tools about the shop.

The Barr Adjustable Vernier Size Block has a wide platform extending from the front face of the block. A limited base area permits the unit to be easily positioned on bosses, pads and lugs, and in hardto-get-at areas of machined castings.



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Barr Adjustable Vernier Size Block

The vernier readings of the unit refer to the face of the platform, with the base of the block as zero. The bar scale is adjustable to compensate for any wear on the base of the block, A thumbscrew is provided on the platform to accommodate an arm for holding a dial indicator.

The Barr Adjustable Vernier Size Block is made of high quality alloy steel which is hardened and buffed to a natural

bright finish.

#### Reversible Thread Gage

Identified as the Model LL, a reversible type thread gage having approximately twice the gaging length of a



### COLD RIVETERS and AUTOMATIC STAKING MACHINES

For staking, riveting, eyeletting, burring, etc., this high speed staking machine (at left) will produce over 1000 pieces per hour. Adjustable hammer blow, easily and safely operated.

This cold riveter (at right) is made in ten sizes to handle work from 1/64" to 2" diameter. Write for complete information. SEND SAMPLES FOR DEMONSTRATION PURPOSES.

HIGH SPEED HAMMER CO., INC. 307 NORTON ST. ROCHESTER 5, N. Y.





Model LL Reversible Thread Gage

standard A.G.D. thread gage is now being distributed by the Swedish Gage Company of America, 8900 Alpine Ave., Detroit 4, Mich. After normal wear, the gaging members can be readily reversed within the aluminum handle for additional gage life.

Comparable in design and length to the A.G.D. handle, the aluminum handle furnished is said to assure lightweight and ease of handling for correct gage feel. Steel tapered nuts with positive locking action against the aluminum handle are claimed to prevent the gaging members from slipping or backing out of the handle during use. An identifying red groove is provided to indicate the "no go" portion of the gage.

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The Model LL Reversible Thread Gage can be adjusted to any reasonable minimum or maximum length for the easy checking of special depth threaded holes.

#### **Precision Clamp**

Designed to increase production by reducing set-up time to a minimum, a precision clamp which is said to be simple to operate and can be used to clamp all types of

materials on lathes, milling machines, planers, index tables, shapers, grinders, and jig borers is announced by the Kellner Tool & Machine Co., 18490 Mt. Elliott, Detroit 34. Michigan.

The clamp consists of two heat-treated steel members, a screw for adjusting the unit to a parallel position, (eliminating the need for clamping blocks), a screw for tightening the clamp to hold the work firmly, and a screw for fastening the clamp to a T-slot or open slot. A plain hole is provided in the upper member of the clamp through which an Allen wrench can be inserted to loosen clamp from or tighten to table or faceplate.



Moto-Tool Kit No. 2, with 23 accessories (high speed steel cutters, grinding wheels, polishing accessories) a nd heavy - duty Model 2 Moto-Tool in natural finish, hard-wood case . . .\$23.50. (Items purchased separately would cost about \$30.00; you save \$6.50.)

Moto-Tool No. 2, with one emery point . . . \$16.50.

SEE YOUR MILL SUPPLY DEALER
If he does not handle Mote-Tool, write the factory

DREMEL MIG. CO., Dept. 1229-E, Rucine, Wit.



Illustration Showing Kellner Precision Clamps Being Used to Hold Carburetor Part on Index Table

Designed to relieve stresses on index tables, the Kellner Precision Clamp is available in two models designated as the Nos. 375 and 500 and utilizing % and ½-inch Allen screws respectively.

#### Redesigned Hand Tool Holder

The M. E. Cunningham Co., 158 E. Carson St., Pittsburgh 19, Pa., announces that its adjustable hand tool holder has been redesigned of lightweight cast aluminum which, it is claimed, has greatly improved the construction and efficiency of this device for holding hand stamps and other tools. Although considerably stronger than the previous steel tubing construction, the redesigned hand tool holder is said to be much lighter and more convenient to handle. The holder "head" section has been strengthened in the new design, and the wall thickness at the corners is approximately 1/4 inch where it was formerly 3 inch.

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The Cunningham Redesigned Hand Tool Holder is available in two models—Model HTF-1 with finger lever-type control for the fast opening of the holder when stamps or tools are inserted or released, and Model HTS-2 with knurled adjustable screw-type control for adjusting the lever spring to accommodate various size tools. Designed to prevent smashed fingers and flying stamps caused by off-angle hammer blows, the holder is said to be ideal for use by inspectors in aircraft and steel-producing



Next time try R & N Taps.

Nothing is as convincing as your own experience.

Send us your toughest tapping job. That is the way many leading industries learned what R & N ground from the solid production Taps could do. We guarantee satisfaction. Give R & N a trial and be convinced.

Let us know your tapping problems. Our service engineers will solve them promptly.

REIFF & NESTOR COMPANY

manufacturers of TAPS AND REAMERS

LYKENS, PA.



Cunningham Redesigned Hand Tool Holder

plants, in government inspection, and for any operation involving the use of hand

stamps, chisels, drifts, star drills, center punches, and so on.

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The holder is available in the following range of sizes: Size No. 1 for holding 1/4 to 1/2inch width or diameter tools; Size No. 2 for 1/4 to 3/4inch width or diameter tools; Size No. 3 for 1/2 to 1inch tools; and Size No. 4 for ¾ to 1¼-inch tools. The weights of Sizes Nos. 1, 2 and 3 range from 34 to 1 lb. All sizes can be used with square, octagon, or round tools. Both the Model HTF-1 and Model HTS-2 are furnished in a full

#### Portable Power Saw

range of sizes.

A portable power saw and file designated as the E-Z Saw has been introduced by the Anchor Manufacturing Co., Inc., 2533 E. 73rd St., Chicago 49, Ill. Designed for attaching directly to electric or air drills or a flexible shaft for power,

the device features a unique mechanism which converts the rotary action of the power unit to a reciprocating motion. By inserting an ordinary hack saw blade in the holder, a fast power saw is provided that is said to quickly cut through all metals, including stainless steel, Monel, and corrugated stock, as well as other materials. The unit can be quickly converted to a power file by simply inserting a machine file in place of the saw blade. Special blades are available for extremely heavy cutting operations.

Designed to operate with a rapid %inch stroke, the E-Z Saw includes an adjustable handle which can be turned



# It's <u>Easy</u> to Use <u>This MUSIC WIRE</u>



#### See PRECISION BRAND'S Dispenser Carton New

Save time, speed work with this top quality Music Wire packed in the ingenious dispenser carton—exclusive with Precision Brand. Wire is pulled from center; tension holds coil in place. Wire is cold drawn with micrometer precision to meet exacting requirements. Immediate delivery on a complete range of thickness .004 to .180 diameter.

#### SHIM STOCK



Brass or Steel



Whether you choose the dispenser carton, the four-in-one assortment or flat stock packets, you can depend upon Precision Brand quality, accuracy, protective packaging and plain labeling to help do the job right.

#### CONSULT YOUR JOBBER



SHIM STEEL THICKNESS SAUGE STOCK

WAREHOUSE. INC. MANUFACTURING DIVISION 4409 WEST KINZIE ST., CHICAGO 24, ILL. and locked in any desired position, thus making the unit readily maneuverable in close quarters. The E-Z Saw may be ob-



E-Z Saw

tained complete with an electric or air drill or without a drill for attachment to the user's own power tool.

#### Direct Reading Dial

Designated as the "Revodex," a simple direct reading dial for use on all small and medium size lathes, milling ma-chines, and other machine tools is announced by Van Dyke Instruments, Inc., 1401 Airway Drive, Glendale, Calif. The dial consists of two inter-geared dials, one of which reads in thousandths of an inch and is said to be comparable to the standard dial on most machine tools. The other dial reads in tenths of an inch and indicates the actual number of revolutions of the first dial.



"Revodex" Direct Reading Dial

The Revodex Direct Reading Dial, which is adaptable to all shaft diameters from ¼ to ⅓ inch, is 1½ inches in diameter x ¾ inch thick. Graduations are machine cut and widely spaced for ease of reading. A thumbscrew permits instantaneous zero adjustment. The Revodex is said to be suitable for use on all equipment employing screw feed travel where accurate cutting tool adjustments or precise table movements are essential.

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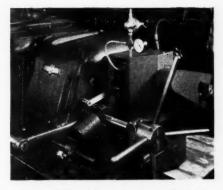
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#### Centerless Grinder Attachment

Designed for use on a No. 2 Cincinnatic centerless grinder, an attachment now being offered by the Bennett Equipment Co., 4725 Ellery, Detroit 7, Mich., is said to permit the grinder to be operated either automatically or manually with a change-over time of less than two minutes. Known as the "Auto-Feed," the attachment can be quickly installed and is claimed to be practically foolproof.

The accompanying illustration shows the simple method by which the automatic yoke of the attachment is attached to the worm wheel, allowing the hand infeed lever to remain on the grinder. The change-over from manual to automatic



Bennett "Auto-Feed" Attachment Set Up for Use

operation is effected by tightening the pinch bolt on the Auto-Feed yoke and loosening the pinch bolt on the hand infeed lever. The drive arm is actuated by two reciprocating cams for positive accuracy and uniformity of feed. The air operated ram ejects the work at the finish of each grinding operation. The Auto-Feed is made to handle any tapered or shoulder work.

#### NEW GRAHAM CENTERING VISE

With left and right hand screw, both jaws move toward center, centering work regardless of size variations. This gives double-fast action. Can be used with interchangeable V jaws. Handle fits either end.

#### MULTI-PURPOSE SWIVEL BASE VISE

Has exclusive ADJUSTABLE ZERO POINTER to assure coincidence with zero on base. Complete 360° rotation. Positive 2-point lock in any position. Screw never protrudes under work, cannot be drilled into. Usable with special jaws and jig attachments described below. Removable from base for use plain.

#### JIG ATTACHMENT VISE

Usable plain. Also drilled and tapped for stops, guides, bushing plates and other attachments making it a Multi-purpose jig or fixture serving many repeat-operation needs saving the cost of making special devices.

ALSO "ADJUSTANGLE-KNURL TOOL FITTING TURRET

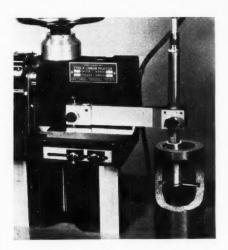
Request Illustrated Price Bulletin 44
GRAHAM MFG. CO., EAST GREENWICH, R. 1.



### Tracer for Profilometer Amplimeter

Designated as the Type GB, a tracer for use with all Profilometer Amplimeters in taking surface roughness measurements on hard-to-reach surfaces is announced by the Physicists Research Co., 321 S. Main St., Ann Arbor, Mich. The tracer can be used for measuring on internal grooves and slots; tracing axially in small holes; tracing both transversely and longitudinally in narrow slots and grooves and on gear teeth; tracing on internal and external tapered surfaces.





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Type GB Tracer in Use

In order to enter small holes and slots, the tracing point is located at the end of a narrow beam which projects horizontally from the bottom of the tracer, and no skids are used. Because of this construction, the Type GB Tracer must be operated mechanically by a Piloter. A pivoted arm is provided for attaching the tracer to the Piloter.

The Type GB Tracer can be used with the beam at any desired angle to the direction of trace. Thus, with the beam at right angles to the path of travel, lengthwise tracing is permitted in slots and on shoulders. The Type GB Tracer is designed to measure flats and outside diameters and has an internal range of fi inch to flat. It is constructed to measure in fi-inch holes or fig-inch slots to a depth of 1/4 inch, in fi-inch holes or fig-inch slots to 3/4-inch depth, and on gear

TO INCREASE PRODUCTION AND TO IMPROVE EFFICIENCY USE

#### **BUTTERFLY FILING AND DIE MAKING MACHINES**

This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models, No. 16, No. 14 "EL" and Model "D." The larger the Model, the bigger the stroke and therefore more filing is performed. Furnished with or without pedestals. Constructed as per specification of U. S. Naval Aircraft Factories.

#### HARVEY MFG. CORP.

161 Grand St., New York,

Phone Canal 6-5170



teeth as small as 18 pitch. The tracer may be inserted into vertical holes of 1% inches minimum diameter to a depth of 5% inches and, when used with a Type A Linear Piloter, has a vertical adjustment of 0 to 5% inches above the base plate.

**Ductile Cast Iron** 

An engineering material described as ductile cast iron which is said to combine the process advantages of gray cast iron, such as fluidity, castability, and machinability, with the product advantages of

cast steel has been developed by The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. The material is characterized by a graphite structure in the form of spheroids, free from graphite in the flake form. Its excellent physical properties, particularly high elastic modulus, high yield strength, and ductility, suggest its suitability for many applications hitherto considered beyond the scope of cast iron.

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The production of this iron can be applied to common cast iron compositions melted in the cupola or in other kinds of furnaces, and is based on the introduction into the iron of a small but effective amount of magnesium or a magnesium - containing addition agent, such as nickelmagnesium alloy. The potential applications for the material include component parts too numerous to detail; machinery in general, including machine

tools, crankshafts, pumps, compressors, valves, and heavy industrial equipment, such as rolls and rolling mill housings; railroad car wheels and ingot molds; engine, furnace and other parts used at elevated temperatures; pipe; textile machinery; electrical machinery; paper machinery; and marine equipment.

#### Diamond Tool Accessory

The Wheel Trueing Tool Co., 3200 W. Davison Ave., Detroit, Mich., announces that a diamond tool accessory known as

# Fiske Darl Oil

The Base Cutting Oil that has FLEXIBILITY

FISKE'S "DARL" OIL can be used straight or reduced with mineral oil to the degree suitable for the tool, the work and the metal. That is FLEXIBILITY. "DARL" OIL works both ferrous and non-ferrous metals. It is non-corrosive, and permits visibility when mixed. Having exceptional anti-weld value, lubricity and high film strength, it is therefore excellent in drawing and stamping as well as for machining. Standardize with "DARL" and save money.

There is a Fiske Lubricant for every metal working operation. Each is an outstanding product and results in more production, better finish and increased tool life. Let us solve your special problems. Write today to Fiske Brothers Refining Co., 131 Lockwood St., Newark 5, N. J., or 1502 Oakdale Ave., Toledo 5, Ohio.



Established 1870

METAL WORKING LUBRICANTS

the "Diamond-Miser" has been added to its line.

The Diamond-Miser is a special diamond tool holder that is installed upon the grinding machine in a position which assures the diamond being presented to the wheel at the correct angle for efficient cutting. Following each pass across the face of the grinding wheel, a metered indexing mechanism automatically rotates the diamond tool a predetermined number of degrees, assuring that no facet is ever re-used in identical form but is always turned just enough to present a new and effective cutting

SKETCHES ARE

EASY TO MAKE

AND READ!

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er steady user of WADE'S ISOME-

TRIC blue lined

paper, Shows all

surfaces and in-

terior to scale.

One trial will

ing mechanism for manual turning also is available for installation where automatic turning is not indicated.

The constant me-

edge to the wheel. A metered index-

tered turning, plus infeed, provides for automatic resharpening of the diamond and thus maintains its cutting ability at maxi m u m efficiency. Scientific control of the tool angle and metered rotation prevents facets from passing the center line and, consequently, the diamond is never



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Wheel Trueing "Diamond-Miser" for Metered Indexing by Automatic Rotation

diamond is never allowed to wear into large, ineffective "flats," it is claimed. Because of precision turning of the diamond through mechanical control,

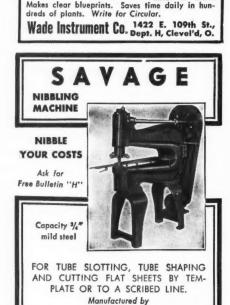
minimum infeed of the diamond is required and proper wheel dressing is accomplished with small wear on the dia-

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mond and on the wheel.

Transparent Oil Cup

Designated as the Die-Co Oiler, a transparent oil cup which is said to assure the positive lubrication of pins and bushings on vertical die sets of such equipment as punch presses, and so on, is now being manufactured by the Die Supply Co., 5349 St. Clair Ave., Cleveland 14, Ohio. The cup is molded of clear, sheckproof Tenite plastic over a brass insert which is fitted with a Neoprene ring to prevent loss of lubricant and to



New Nesting Type
TOTE PANS
20" Long x 12"
Wide x 61/4" Deep
16 Ga., drag holes,
handles both ends.

20" LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

Knoxville

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W. J. SAVAGE COMPANY

Since 1885

Pioneer Mnfrs. of Nibbling Machines

**Tennessee** 

vipe abrasive dirt from the pins. The hape of the cup keeps scale from geting into the grease. Only a small amount of diemaker's grease is needed in the cup or a thorough lubricating job.

The plastic used in the construction of he Die-Co Oiler is described as unusually ough and durable, and is said to be uniffected by oil or grease. The oiler may be easily installed on any die set.

#### Foot Valve

Featuring a large, low treadle surface set at an angle which provides for comfortable operation, a fast-acting foot valve identified as the Model 201 is announced by the Mead Specialties Co., Dept. FV-42, 4114 N. Knox Ave., Chicago 41, Ill. Only a small amount of foot movement is required to operate the valve from full closed to full open position.

Hardened 60-degree cone-pointed screws with convenient lock nuts support the treadle like a piece of work set up on centers in a lathe. This construction is not only said to provide an ideal mounting for smooth, accurate treadle movement but also permits infinite adjustment for wear. A hardened wear plate floats between the cam and plun-

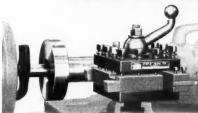


Mead Model 201 Foot Valve

ger of the valve to eliminate all side thrust on the plunger and to provide a wide, smooth-sliding surface for the cam, which is part of the cast iron treadle. The plate is easily replaceable. The valve is held to the base casting with two screws and a clamp plate on the underside. To ensure accurate positioning, a set screw and lock nut support the valve against the thrust of the plunger.

Of self-cleaning poppet type construction, the Mead Model 201 Foot Valve can be used as a 3-way normally-closed selflocking unit; 3 way normally-open self-

### ENCO TURRET TOOLPOSTS REDUCE PER PIECE COSTS ON ENGINE LATHE WORK



Model HD-2 shown mounted on heavy duty 16" lathe in large midwest machine builder's plant. Part being machined is expansion head made of 8640 sulphite steel forging. Note unusual tooling setup. A 50% saving in production time was reported on this job.

Write for catalog No. 48 which shows typical application photos of many of Enco's 35 Models on actual jobs. When writing give lathe name and swing, also maximum tool size to be used.

SPECIFICATIONS OF A FEW OF MANY ENCO TURRETS

Model No.	HD-2	6-5	41/2-R	41/2-5	31/2-R	31/2-5
Suggested Lathe Size	16" to 24"	14" to 20"	15" to 19"	13" to 16"	12" to 15"	10" to 13"
Tool Block Size	6½" sq.	6" sq.	4½" sq.	4½" sq.	3½" sq.	31/2" sq.
Solid Tool Capacity	11/2''	11/4"	1"	3/4**	7/8**	1/2**
Price	\$138.50	103.50	66.50	53.50	46.00	36.75

Also Mirs. of Enco Hexturret Bed Turrets and Tallstock Turrets for 9" to 18" Lathes. ENCO MANUFACTURING COMPANY, Dept. 159, 4524 Fullerton Ave., Chicago 39, III.

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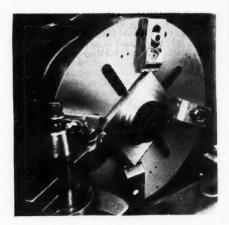
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locking unit; 3-way normally closed selfreleasing unit; and 3-way normally-open self releasing unit.

#### All-Purpose Jaw Clamp

An all-purpose jaw clamp designed for holding practically every size and shape of workpiece quickly and firmly against the faceplate or table of a machine is now being introduced by the J & S Tool Co., Inc., 475 Main St., East Orange, N. J. No part of the clamp is higher than 15 inch, thus making is possible to pass over the entire clamp when holding work 1 inch high or more. The full surface of work % inches high or over may be machined since the jaw is only # inch thick.

The J & S Jaw Clamp can be used in performing machining operations on lathes, planers, milling machines, drill presses, and other machine tools, as well as special production machinery. It can also be used by tool and machine builders of various kinds. Since the clamp does not extend above any part of a workpiece over % inch thick, it cannot interfere with the reading of indicator dials of vertical boring and milling machines,



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Illustration Showing J & S All-Purpose Jaw Clamps in Use on the Faceplate of a Lathe

The J & S All-Purpose Jaw Clamp is made of hardened tool steel throughout and is supplied in sets of four, together with standard socket wrenches, hardened T-slot nuts, 1/2-13 special bolts and hardened washers.



#### Self-Expanding Lap

Known as the "Xpand-O-Lap," a selfexpanding lap consisting of one steel arbor, two copper sleeves, and one S-shaped spring has been placed on the market by the Chicago Broach Co., Dept. MM, 5516 W. Lake St., Chicago 44, Ill. The lap is self-expanding due to the constant pressure exerted by the S-shaped spring on the two sleeves. The wearing surface of the lap extends the full length of the



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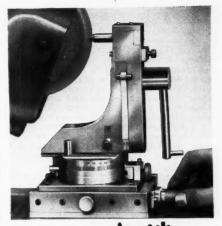
"Xpand-O-Laps"

sleeves, resulting in unusually fast lapping and long tool life.

An outstanding advantage claimed for the Xpand-O-Lap is that the sleeves are self-aligning when the tool is inserted in a hole for lapping due to the fact that the sleeves are free to move in any direction. If desired, Xpand-O-Laps can be used in a multiple setup for lapping several holes at one time by merely inserting in a multiple drill head. The laps are furnished in sets of six ranging from 1/8 to 1/2 inch in steps of 1/6 inch.

#### Mechanical Differential

A precision made mechanical differential intended for a wide range of applications where measuring and controlling is



### ation\* form-dressing even by a beginner

Two angles and a radius can be dressed in one continuous motion.

- Precise, sharp contours are obtainable consistently to .0001" accuracy
- Simple, rapid operation.
- Micrometer feed to wheel.
- Capacity to 14" wheel.
- Dust protected.
- Special fixtures for T slot machines.
- 180° radius attachment.

Also manufacturers of

#### FORM-MASTER WHEEL DRESSER

Lower-priced—Accurate to .0002" Capacity to 10" wheel Dust proof. Price \$150.00.

Precision form tool grinding on high speed steel and carbides

Write for Literature

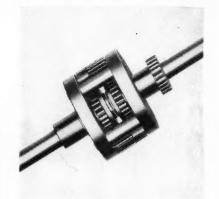
\* Reg.U.S.Pat.Off.



involved is now being marketed by the Milwaukee Lock & Mfg. Co., 5086 N. 37th

St., Milwaukee 9, Wisconsin.

According to the manufacturer, the differential can be used in measuring and controlling relative speeds, speed sums and speed differences, angular sums and angular differences; accurately controlling speeds and positions; measuring and controlling greatly multiplying speed ranges; obtaining great speed ratios between shafts; indicating and controlling torque and speed direction; indicating and controlling rates of acceleration and deceleration; automatically controlling sequence operations; quickly and reliably reversing and changing speeds without discon-



Milwaukee Mechanical Differential

В R The IMPROVED Compound Lever Shears ALL ALLOY FULLY GUARANTEED Two Sixes PORTABLE No. 1 cuts up to No. 11 gauge strip or sheet. No. 2 cuts up to  $\frac{1}{4}$ " steel plate. BREMIL MFG. CO. 1400 Pittsburgh Ave., Erie, Pa.

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print. CUTTER SPECIALISTS SINCE 1919. A few territories open. Write today for prices.

QUALITY TOOL WORKS WAUKEGAN ILLINOIS

necting power sources; shifting phase angles between rotating shafts; operating devices and receiving indications from inside rotating shafts; providing a reliable clutch for connecting and disconnecting power or effecting power transfers, and so on.

The Milwaukee Mechanical Differential is available in either a conventional open style (as illustrated) or in a jacketed style which is grease lubricated. The differential can be produced in a wide range of sizes and with special constructions.

#### Form Tools

A wide range of special form tools is now being manufactured under the trade name of "Micro-Keen" by the Johns-

#### THREE SIMPLE STEPS



WALTON COMPANY

Remove broken taps with WALTON TAP EXTRACTORS as fast as 1, 2, 3. First, slide fingers into flutes of broken tap. 2. Adjust holder and sleeve to the work. 3. Apply tap wrench and back out the broken tap.

Economical; time saving; tested and proved for years in all kinds of shops. See your dealer or write us for Folder No. 10 and details of free trial offer.

Hartford 10, Conn.

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Hartford Tool Co., Box 314, Hartford, Conn. Made of Carbalt high speed steel, the tools available include circular and dat tools, counterbores, reamers, recessing tools, flat drills, punches, rolls, and heading dies.

#### Air, Water and Hydraulic Cylinder

Featuring a simplified construction which provides for unusually long wear with minimum maintenance, a cylinder

that may be operated with air, water, or hydraulic power has been introduced by the Ortman-Miller Machine Co., Inc., 1222 150th St., Hammond, Ind. Designated as the O.M., the cylinder is of tie - rodless design which provides for a compact construction that enables the unit to be installed in a minimum of space.

The O.M. Cylinder is available in bore sizes from 11/2 to 8 inches and its operation is said to be guaranteed to 1,500 cycles per minute continuous duty. Additional features of the cylinder include allsteel body parts to assure durability; bearing bronze on all moving surfaces; interchangeable mounting brackets which may be applied to the cylinder without any disassembly of the cylinder unit; ports which may be oriented independently at random without disassembly and without disturbing the self-adjusting seals; and extra large piston rod



O.M. Cylinder

which is one continuous ground and polished shaft of 10,000 p.s.i. tensile strength. The cylinder is available with self-aligning and regulating or adjustable cushions for either or both ends.

### OPERATION SAFETY

A weight-loaded accumulator can be dangerous—without an R. D. Wood Protectomatic Valve! Hydraulic pipeline failures can happen without warning—can mean a crashing tank or platform, machinery downtime throughout the system, extensive repair work, serious personal injury.

An R. D. Wood Protectomatic Valve stops this! Installed on an accumulator tank, this rugged valve means automatic control of the falling speed of a weighted accumulator—automatic freedom from danger. For safety in your plant, write for Data Sheets on the R. D. Wood Protectomatic Valve!

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE - ACCUMULATORS - ALLEVIATORS - INTENSIFIERS



R.D. Wood Company

PUBLIC LEDGER BLDG., PHILA. 5, PA.

### LEATHER • CANVAS • SHEEPSKIN • LEATHERETTE RUBBER



Die-cut leather pieces

Special shapes cut, sewed, glued, embossed, eyeletted, assembled to order. Samples and estimates furnished promptly.

### NORTHLAND SALES & MFG. CO.

1445 N. 5th St.

Milwaukee 12, Wis.

### "SKELTON" TAPER REAMERS



Rougher

The Roughing Reamer with two cutting edges ground radial on a taper to correspond with hole to be reamed. Two opposite edges are "backed off" to govern chip thickness. This "safety edge" prevents "hogging in" or "chattering." A special feature permits straight, centralized holes, even though turret is out of line with spindle. Write for Folder "S" describing Taper Reamers and Boring Bars.



Finisher

Morse, B & S and SAE Tapers in stock.
Specials to order.

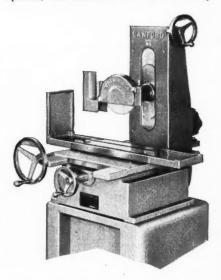
Dealer Territories Available

### ONONDAGA TOOL CORP.

#### Improved Surface Grinder

An improved surface grinder designated as the Model MG is announced by the Sanford Mfg. Co., 1021 Commerce Ave., Union, N. J. Its 12 x 8 x 12-inch capacity combined with the sturdy construction is said to make the machine an ideal toolroom grinder of long-lasting accuracy.

Using a 6 x ½ x 1¼-inch wheel with standard adapters on the ruggedly built spindle, the machine can be efficiently



Sanford Improved Model MG Surface Grinder

employed for form and crush grinding operations, as well as a wide range of other work.

### Large-Size Automatic Recessing Tool

The Maxwell Co., 325 Broadway, Bedford, Ohio, has announced the development of a large-size automatic recessing tool designed especially for use on radial drills, boring mills, and large boring machines, as well as drill presses. The tool, which employs the same standard MaxWELL-Made rack and gear operating mechanism as used in the smaller tools of the same line, can be used in conjunction with comparatively heavy machines

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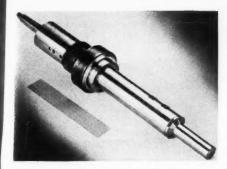
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Max-WELL-Made Large-Size Automatic Recessing Tool

to recess internal forms normally considered inaccessible for standard equipment.

Because of the ball bearing loaded pilot feature, the tool can be used in conjunction with existing fixtures. If fixtures are not used, the tool collar will stop on the workpiece surface to accurately locate the cutters and the subsequent recesses. Cutter bits can be positioned to meet individual specifications and, with the tool,

cutters can be located for cutting deep recesses in relation to the workpiece outer surface.

Provisions have been made for supporting the tool either at the far end of the workpiece or in the bore itself. Cutter feeds can be furnished in a ratio of approximately 1:3 as compared to the spindle speed. Individual cutters can be made of either high-speed steel or carbide-tipped steel, depending upon the user's specifications. Additional features of the tool include the use of select steels for the various working members of the rack and gear mechanism, as well as interchangeable shanks.

#### Vitreous Enameled Round Power Rheostat

The Rex Rheostat Co., 3 Foxhurst Rd., P. O. Box 332, Baldwin, L. I., N. Y., is now marketing a round power rheostat having a winding of resistance wire or ribbon that is uniformly distributed around a ceramic core and maintained firmly in position by a protective coat of vitreous enamel. The core is cemented to a base of gray porcelain with a special heat and water-resisting cement.

### WHITNEY- JENSEN PRODUCTS

#### No. 455 ANGLE IRON COMBINATION SHEAR-NOTCHER-BENDER

Consists of No. 4 Shear, No. 50 Notcher, No. 51 Bender Will shear, notch, and bend all angles thru 2" x 2" x 1/4"





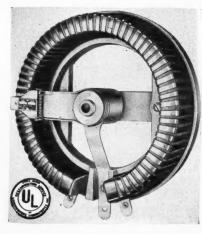
#### No. 38 THROATLESS BENCH SHEAR

Capacity—3/16"
Blade Length—5"
Weight—41 lbs.
Write for Catalog 16-49

WHITNEY METAL TOOL COMPANY

The contact arm of the Rex Round Rheostat consists of a channel shaped center truss spring hinged to a contact block holder. The hinge spring is said to assure the correct constant pressure between the contact block of copper-graphite and the winding at all points of the sliding path and, due to its elasticity, the rheostat is claimed to be easy and smooth to operate. A jumper connects the contact block directly with the center truss which turns on the stationary center terminal. The two latter parts are kept in close contact by a strong helical compression spring. A self-lubricating

washer of copper-graphite between the stationary and the movable part of the contact arm is said to prevent "freezing"



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Rex Vitreous Enameled Round Power Rheostat

and to retain the smooth operation permanently.

All live parts of the rheostat are electrically insulated from the mounting parts and the shaft. The insulating parts are of strong ceramic material which, it is claimed, does not change its shape or properties. Cooling is effected by recessing the base so that air can circulate freely on all sides of the rheostat.

#### Reversible Plug Gage

A plug gage having reversible gaging members, thereby providing for long gage life, has been announced by Pratt &





E. KARELSEN, INC. 125 WEST 45TH STREET NEW YORK 19, N. Y.

MODERN MACHINE SHOP

EST 1852



Pratt & Whitney Reversible Plug Gage

Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. When a

member has worn below size, it can be quickly and easily replaced by simply unscrewing the colored locking nut (green for "go" and red for "not go"), reversing the bushing and screwing the locking nut on the handle.

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The Pratt and Whitney Reversible Plug Gage is regularly furnished as a cylindrical or thread plug type. Members of the cylindrical plug type gage are made to American Gage Design Standard in sizes from 0.030 to 0.510 inch in steel, chromium plate and carbide. Thread gage members are furnished to X tolerance for checking NC and NF threads in sizes from 0 to 1/2 inch. Members with other thread forms can be readily obtained on special

All cylindrical and thread members are hardened, ground, and precision lapped to close tolerances. The Pratt & Whitney "Pilot Feature" may be added to cylindrical members above 0.240 inch in diameter to facilitate entry into close tolerance h o l e s. Convolution and chip grooves are provided on thread members in accordance with standard practice.

#### Quick-Change Toolholder

The Universal Engineering Co., Frankenmuth 9, Mich., announces a toolholder, known as the "Kwik Switch," which is designed to allow for rapid changing of tools on jobs requiring multiple opera-





"Kwick Switch" Toolholder

tions such as drilling, tapping, and boring. The unit comprises a master chuck which is constructed to fit into the machine, and adapter chucks which hold the tools rigidly and fit into the master chuck

where they can be firmly fastened with less than a quarter turn by hand of a locking unit. Consecutive operations may be performed without readjusting the tools, machine, or changing the position of the work.

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The Kwick Switch Toolholder is designed to handle tools with either straight or taper shanks. The master chuck is available with straight and taper shanks to fit all standard machine tools.

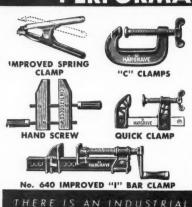
#### 5-Inch Medium Duty Universal Chuck

A 5-inch medium duty universal chuck with two sets of jaws (male and female) and wrench and featuring three separate pinions has been announced by the L-W Chuck Co., 28 S. St. Clair St., Toledo 4, Ohio. Easy to operate, the chuck provides for maximum accuracy, together with minimum wear on the ring gear. The body is a semi-steel casting with highly ground finish. The hardened jaws with ground steps are said to assure a firm grip.

The L-W 5-Inch Medium Duty Universal Chuck can be used on any lathe hav-

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"INDIVIDUALLY TESTED"

Hargrave Clamps have been constantly improved with the aid of skilled mechanics to offer greater operating advantages and increased durability. Individually Tested, they must be stronger, tougher and flaw-free. Made in openings from 3/4 in. to 10 ft., from 1/2 in. to 16 in. deep.

#### WRITE FOR CATALOG

showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Star Drills, File Cleaners, Brace Wrenches, Washer Cutters, Saw Vises, etc.

> 1947 Waverly Ave. Cincinnati 12, Ohio



316

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ing a 11/2-inch 8-thread spindle, including most models of Atlas, South Bend, Logan and Clausing. By the use of a conventional back adapter plate, the chuck can be mounted on any size and type of lathe. It also fits and is ready for mounting on the L-W 61/2-inch SD dividing head.

In addition to the 5-inch medium duty universal chuck, the company is offering extra sturdy 6 and 8-inch independent 4-jaw chucks having reversible jaws with hardened and ground steps, as well as



L-W Lathe Chucks: (Above) 5-Inch Medium Duty Universal Chuck and (Below) Independent 4-Jaw Chuck

cast semi-steel bodies with ground finish. The chuck screws and bearings are made of tough steel and hardened for wear.

#### Interlocking Drawer Unit

Designed for parts storage, an interlocking drawer unit of all-steel construction has been developed by the Cincinnati Ventilating Co., Inc., Covington, Ky. Engineered to interlock with other drawer units at the top, bottom, and sides to form a rigid cabinet, the unit is available with a large multi-drawer which is designed to accommodate five dividers and measures 111 inches front to back x 318 inches wide x 3 inches deep. The unit can also be obtained with a similarly design-





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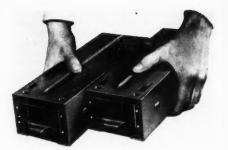
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Representatives in Principal Cities

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Cincinnati Interlocking Drawer Units

ed small parts multi drawer accommodating three dividers and measuring 5 inches front to back x 2\% inches wide x 2\% inches deep.

According to the manufacturer, Cincinnati Interlocking Drawer Units can be quickly assembled to fit any size or shape space.

#### Plastic Soft Jaw Blank

To eliminate marring of workpieces having machined surfaces, as well as the distortion of tubing or other thin-wall parts, when held in a chuck, the Gisholt Machine Co., Dept. A-M, Madison 10, Wis., has developed a lightweight soft jaw blank made of a molded phenolic type of plastic which can be machined to size with the same feeds and speeds as used for brass.

Claimed to have unusual gripping power, the jaw produced from the plastic blank can be used in Gisholt chucks for either first or second-operation work and is recommended for cast iron, aluminum, brass, or any other material that does not require coolant during machining.

Gisholt Plastic Soft Jaw Blanks



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#### Improved Microdapter

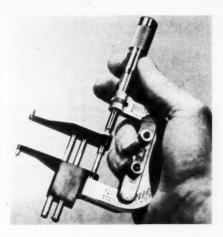
The Rimat Machine Tool Co., Dept. MS3, 1117 Air Way, Glendale 1, Calif., anounces an improved model of the Microlapter—an attachment for taking precion internal measurements with outside nicrometers. Since the measuring points are cone shaped and project beyond each eg, they can be readily inserted into internal grooves, into recesses, behind shoulders, and into deep bores.

The attachment is designed for quick and firm clamping to any micrometer frame, and measurements are read directly on the regular thimble with original micrometer accuracy. A preset zeroing adjustment matches the distance between tips with the micrometer opening. Once set, measurements can be duplicated with any micrometer, it is claimed. An all-steel construction is said to assure rigidity at the tips, resulting in high sensitivity to "feel." When measuring grooves, behind shoulders and similar locations having restricted openings in the workpiece, withdrawal of the tool is possible without altering the micrometer

reading. The legs are manually compressed and withdrawn, returning to

their original position when released.

This feature is said to be especially ad-



Rimat Improved Microdapter Being Used with Outside Micrometer

vantageous when "miking" duplicate

The Rimat Improved Microdapter is available in standard sizes for 1-inch micrometers covering a range of ½ to 1

### ◆ BLACK DIAMOND ◆ PRECISION GRINDER for ALL SMALL DRILLS

#### No Mechanical Skill Needed To Grind Drills Accurately



I F you use small gauge or fractional drills singly or in gangs—by hundreds or thousands—this moderately priced machine motor driven—will keep any quantity sharp and ready for any job.

Anyone can operate a Black Diamond. Even the most inexperienced can keep all drills sharp and true centered, with smooth lips ground to exactly the same length—at the proper angle and with correct clearance for fast, precision drilling.

Black Diamond Grinders cut 50% and more on drill grinding as well as drilling costs, sharpen without waste of expensive drill stock, reduce drill breakage and work spoilage to a minimum.

The built-in Diamond Dresser keeps the grinding wheel ever-sharp cutting and the Web Thinning Attachment cares for all types of Notched points to perfection.

Write for New Bulletin

BLACK DIAMOND SAW & MACHINE WORKS, INC.
47 NORTH AVENUE . . . NATICK, MASSACHUSETTS

inch, for 2-inch micrometers covering a range of 1 to 2 inches, and for 3-inch micrometers covering a range of 2 to 3 inches. Other sizes and special tip shapes can be furnished on order.

#### Impact Sockets

Recent additions to the line of Williams Impact "Supersockets" marketed by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y., have increased the number of sockets in the various styles and sizes to over 150.

### GEARS **GOOD GEARS ONLY**

All Kinds—Any Quantity AT THE RIGHT PRICE THE CINCINNATI GEAR CO. Woester Pike Cincinnati, Ohio

#### **60 YEARS MANUFACTURING**

Multiple Spindle Drilling and Tapping Machines • Automatic Drilling and Tapping Units Multiple Spindle Attachable Drill Heads • Hot and Cold Swaging Machines • Hammering Machines • Tools, Jigs and Fixtures • Contract Work . Special Machinery.

LANGELIER MANUFACTURING CO.

Providence 7, Rhode Island



Illustration Showing Williams Impact "Supersocket," Including Its Use in Power Tool for Nut Setting

According to the manufacturer, Williams Impact Supersockets are adaptable to all socket locking methods used on the various types and makes of power and impact wrenches. Their accurate fit and precision machining are said to assure long life and safe, dependable service. The sockets are made of extra tough alloy steel, specially heat treated to withstand constant shock and pounding.

Williams Impact Supersockets are available in seven square drive sizes with hex opening from 3 to 31/2 inches and 8point openings from 16 to 11/4 inches, in regular and bolt clearance lengths.

#### Screw Machine Drill

A heavy duty, spiral fluted, carbidetipped drill designed for hand and automatic screw machines and chucking ma-



#### PORTABLE METAL BRAKES

Well balanced, easily operated sturdy construction. Equipped with two screw type clamps to afford easy bench mounting, also other styles-literature on request. DEALERS WANTED.

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10" BRAKE only \$10.00 Capacity 18 Gauge CRS

18" BRAKE only \$39.00 Capacity 18 Gauge CRS

24" BRAKE only \$50.00 Capacity 20 Gauge CRS

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Super Screw Machine Drill

chines has been placed on the market by the Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich. The drill is available in diameters from 3 to 34 inch in increments of 1/64 inch. The length of the drill ranges from 3 inches in the smallest diameter up to 6 inches in the largest diameter.

According to the manufacturer, the Super Screw Machine Drill is specially adapted to use on the above mentioned machines and can be quickly and easily employed in any application where jig bushings are not required.

#### Contour Sanding Wheel

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Merit Products, Inc., 4373 Melrose Ave., Los Angeles 27, Calif., announces that its "Sand-O-Flex" sanding wheel for industrial contour sanding is now available in a smaller model designated as the 300D, which is claimed to be efficient for the production finishing of small parts too large to be deburred by tumbling. The unit consists of an aluminum body which houses a cartridge of abrasive cloth containing six strands fastened to a single core. As the abrasive wears, it unwinds out through the housing in front of six replaceable brushes. When the wheel is rotated, the brushes "cushion" the abrasive and are said to mold it to the work shape.

Abrasive cartridges are available in fine, medium and coarse grits in garnet cloth and aluminum-oxide cloth. The shank of the sander is bored to fit either a ½ or %-inch shaft. The Model 300D, which may be used on most power tools, portable hand drills, flexible shafts, and motor shafts, is provided with a baked-on enamel finish and weighs approximately 8 oz. fully loaded.

BIG saw performance in a compact, economical package the WELLS
No. 5 Metal
Cutting Band Saw now available with wet cutting system . . . .

The advantages of wet cutting, previously available only on larger machines, can now be had on the Wells No. 5 Utility Model Metal Cutting Band Saw. This proved-in-service system reduces cutting costs by reducing cutting time and permitting more cuts per blade. Self-contained and compact, the Wells Wet Cutting System is completely automatic with convenient controls, and does not interfere with portability. Factory-assembled on new machines or available for installation on your present machine. Get full details from your Wells Dealer or write direct.

Wells No. 8 and No. 12 Saws are available for jobs requiring larger capacity.



Products by Wells are Practical

#### METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION 808 TYLER STREET, THREE RIVERS, MICHIGAN



Save Up To 85% of Weld Cleaning Labor—Unretouched photo shows how quick weld spatter "comes clean" when you paint or spray Protect-O-Metal No. 2 before welding. No profit-wasting work with air chisels, wire brushing, or sand blasting. Get smooth, clean surfaces. Unlike all other "spatter-proofing" compounds, Protect-O-Metal No. 2 will not cause smoke, fumes or odors. One coat serves all needs, costs about 1/10¢ per foot of weld, saves up to three times its cost in time savings alone. Order a Trial Gallon (\$3.15) for testing. Your money back if compound does not prove entirely satisfactory.

#### PROTECT-O-METAL No. 2

G. W. Smith & Sons, Inc. 5407 Kemp Road, Dayton 2, Obio

OK. Send me a trial gallon. I understand you will cancel the invoice if I'm not entirely satisfied.

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#### Collared Bushing

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For use with its "Minute Man" keywag broaches, The du Mont Corp., Greenfield Mass., is now offering a collared bushing



"Minute Man" Collared Bushings

in sizes from ½ to 1% inches, with larger sizes available on special order. According to the manufacturer, the design of the bushing facilitates the location of the broach in the bushing and eliminates the necessity of locating the base of the bushing on the arbor press plate. In addition, the collar is said to prevent the bushing from dropping through the bore after the broach has been pushed through.

#### Small Parts Clamp

Noble & Stanton, Inc., 711 Broadway, Bedford, Ohio, has announced the availability of a midget-type clamp, designed to locate small parts positively during machining operations. Designated as the



Noble & Stanton Series No. 250 Midget-Type Clamps

Series No. 250, the clamp is offered in three models, each with a different clamping arrangement. The Model

Name

CHAC-250 is a heel cam clamping assembly, the Model CCCA-250 is a center cam clamping assembly, and the Model HCA-250 is a handknob clamping assembly. Each model incorporates a cam action which provides for maximum job clear-

ance and fingertip operation.

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ng ne The outstanding feature of the Series No. 250 clamp is the clamping toe which can be furnished in either a soft alloy bronze or a hard-chromed heat-treated steel. The soft clamping toe is recommended particularly for gripping finished or ground surfaces while secondary operations are performed. The Series No. 250 clamp also features a wide range of adjustment at both the heel and the clamping end. With the exception of the alloy bronze toe, all parts are heat treated and hard-chromed.

The clamp can be used as a component part in assembly operations as well as in drilling, milling, tapping, and almost every other type of machining job.

Centering Vise

The Graham Manufacturing Co., Inc., 30 Bridge St., East Greenwich, R. I., is

now offering a centering vise wherein both jaws are moved toward the center when the operating crank is turned. The jaws can be opened and closed from either end of the vise, both ends being identical.

Said to position the center of the work



Graham Centering Vise

at a desired point on the machine table regardless of variations in the size of the work, the Graham Centering Vise is equipped with jaws 6 inches wide x 1½ inches high which can be opened to 6½ inches. If desired, the vise can be used with V-jaws (No. 3 size) to center varying sizes of round work. The weight of the vise is 32 pounds.





657 Route 29

#### Centrifugal Blower

The Air and Hydraulic Division of Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill., has announced the development of a single-stage centrifugal blower which is being marketed under the trade name of Lindberg-Fisher. The blower features full 360-degree positioning of the air outlet, thus making it easy to install or adjust and eliminating the need for pipe cutting, welding, and extra piping.

Belt-driven models of the Lindberg-



#### GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Pleneer Award Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

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Lindberg-Fisher Centrifugal Blower

Fisher Centrifugal Blower are designed to utilize a minimum of floor space when installed.

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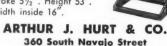
#### HYDRO - PRESS \$84.00

FIVE TONS of smooth power is at your service with this compact and versatile tool.

The perfect press for garage, electric motor shop, refrigerator repair and machine shop.

Will operate lying horizontal.

Ram has removable anvil and retracts itself when released. Weight 100 lbs. Stroke 5½". Height 53". Width inside 16".



Denver 9, Colorado



#### **Electrode Carrier**

Providing a supply of over 30 lb. of electrodes, an electrode carrier designated as the "Rod-Hod" is announced by the Marquette Manufacturing Co., Inc., 307 E. Hennepin Ave., Minneapolis 14, Minn. Furnished are 16 sizes and types of rods to cover a wide range of welding, including No. 130 Red-Rod, No. 140 Production-Rod, No. 40 Blu-Rod, No. 85 Hy-Test-Rod, No. 100 Hard-Rod, No. 550 Hard-Rod, No. 650 Tool-Rod, and No. 44 Nicol-Rod. Each rod is readily identified.



#### SOMERSET Radius Dresser SAVFS TIME

Thou-rinds of Somerset Dressers in service. Offer outstending features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearevelbearing is dustproof.

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SOMERSET TOOL CO. Hillside, N. J.

#### **New Books**

Steel Plates and Their Fabrication.
Edited by Lionel S. Marks, Gordon McKay Professor of Mechanical Engineering, Emeritus of Harvard University.
Published by Lukens Steel Co., 122 Highway Bldg., Coatesville, Pa. 408 pages.
Illustrated. Red cloth binding.

A reference book for engineers and designers who work with steel plates and with structures of which steel plates are a part, this volume contains extensive data of value in se-

lecting steel plates best suited to particular projects. The book also contains information on the analyses of physical properties of carbon and low alloy steels, with charts and tables showing their behavior under sustained and repeated loadings and their resistance to abrasion, corrosion, and temperatures. In addition, the book includes considerable factual material on nickelclad, stainless-clad, Inconel-clad, and Monel-clad steels, their physical and mechanical properties, and plate and head

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"Steel Plates and Their Fabrication" presents historical data and information on open hearth steelmaking, welding, the effect of plate widths on fabrication costs, strength of flat plates and shells, forming, flanging, pressing, flame cutting, fabricated assemblies, and pressure vessels and tanks. A section of more than 100 pages of general engineering information, including mathematical tables, conversion tables, and other material of frequent reference, is also provided.

The book is profusely illustrated with approximately 375 charts, graphs, isometric or other explanatory drawings, and photographs of steelmaking and fabcating operations, as well as of steel plate products and machinery. Engineers and designers desiring a copy of the book should make their requests on company letterheads to the Lukens Steel Company at the address given above.

# FAST - ACCURATE - ECONOMICAL! that's the EXCEL No. 7 SURFACE GRINDER

\$595.00

LESS MOTOR AND PEDESTAL F.O.B. BENTON HARBOR

Built to accurately grind tools, dies, chip breakers and for all round tool-room work, the sturdy No. 7 is also capable of handling many production jobs, freeing larger grinders for other work. You'll find this low priced grinder a really profitable investment.

Built-in COOLANT attachment extra.

Working surface ....5½"×10¾"
Longitudinal travel .....12"
Cross travel ......6½"
Height under 7" wheel..9"

Write Dept. MM-59 for free literature and name of nearest dealer.

DESIGNED AND MANUFACTURED BY

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BENTON HARBOR • MICHIGAN

Elements of Mechanical Vibration. Second Edition. By C. R. Freberg and Emory N. Kemler. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 227 pages. Cloth binding, board covers. Price \$2,75

covers. Price, \$3.75.

The second edition of "Elements of Mechanical Vibration" is distinguished by the addition of two new and important chapters: Sound and Beams. The increased emphasis which engineers must give to noise elimination led to the inclusion of the chapter on sound and its engineering applications. Since beams are a very common structural element, they have been given additional emphasis by com-

bining the previous discussion with new material and presenting it as a separate chapter.

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This edition, like the first, lays great stress on the simple treatment of problems from a basic analysis. It also offers to the reader an extremely wide range of practical problems, an uncomplicated mathematical notation, a simplified, yet adequately detailed, explanation of the more elementary phases of vibration, plus methods and formulas to use and directions for using them.

All of these features combine in a book that helps the student and the engineer solve practical vibration problems with a minimum of complication and theorizing.





MACHINE KEYS





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Machine Rack
 Straight Pins

Cotter Pins and Other "Stanho" Steel Products.

S T A N D A R D HORSE NAIL CORP.

NEW BRIGHTON Since 1872 PENNA.

How Supervisors Can Explain the Economics of Business. By Theodore Handelman. Published by National Foremen's Institute, Inc., Deep River, Conn. 32 pages. Illustrated. Heavy paper covers. Price, 25 cents per copy (discounts on 5 or more copies).

The purpose of this booklet is to furnish the supervisor with background information that will help him inform his workers. Through it the supervisor will be able to provide workers an understanding of the basic economic factors which determine the ability of the employer to furnish employment and to pay high wages. Typical wrong beliefs concerning business and our American system are presented and the answers given in simple language.

The contents of the booklet are arranged as follows: Introduction; Bosses' Salaries; Profits; Government in Business; Capitalism; Distribution Costs; Big Business; Advertising; Company Reserves; Stockholders; Job Security; Benefits of High Production; and The

American System.



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Simplified Practice Recommendation R214-48, Metal-cutting Band Saws. Printed copies of Simplified Practice Recommendation R214-48, Metal-Cutting Band Saws (Hard Edge, Flexible Back), are now available, according to an announcement by the Commodity Standards Division of the National Bureau of Standards. The recommendation, established in 1945, consists of a simplified list of stock types and sizes of hard edge, flexible back, metal-cutting band saws. Width, thickness, and number of teeth per inch are listed for two types of saws-regular and skip-tooth. Size tolerances as well as general provisions covering type of tooth set, shape of teeth, width of set and hardness are included. The revision adds five sizes of regular type and two sizes of skip-tooth metalcutting bands saws, and also adds certain general provisions relating to type of tooth set.

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Copies of the recommendation are available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., for 10 cents each. A discount of 25 per cent will be allowed on orders of 100 or more copies of the recommendation.

#### New Shop Literature

Lyon-Raymond Tote Pan Lift Truck, adjustable for different size tote pans, is illustrated and described in Circular 271 now available free from the Lyon-Raymond Corp., 1294 Madison St., Greene, New York.

Chuck Manual. Speedgrip Chuck, Inc., 1102 W. Beardsley Ave., Elkhart, Ind., has prepared a manual which contains general information on Speedgrip Chucks for internal chucking operations, as well as complete data on practical applications of the chucks and how to use them. Copy free to executives.

High Speed Friction Saws. A four-page illustrated bulletin (9400) prepared by the Kling Bros. Engineering Works, 1318 N. Kostner Ave., Chicago 51, Ill., describes in detail a line of horizontal stroke friction saws for high speed volume and production cutting. Illustrations of the machines, including an installation view in a modern steel warehouse, are presented, as well as cutting data. Copy free.

# Inspection Time Reduced 99% Set-Up Time Cut!

ERICKSON EXPANDING MANDREL MOLDS

±.0005" ACCURACY FOR 11 SIMULTANEOUS
OPERATIONS—WITH ONE SET-UP

Manufacturer previously had great difficulty holding concentricity within  $\pm .0005$ ", and work required 100% inspection. Today, with Erickson mandrel on the job, this manufacturer writes, "Now save 99% of inspection time . . . rejects have been cut to practically nothing. Concentricity is no longer checked, and is well within your .0005" guarantee of accuracy."

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Erickson mandrels have been adapted to solve many tough ID holding problems, such as holding motor stators for machining operations. Why not find out today how the Erickson Mandrel can handle your internal holding job!

Ask for Catalog S-3 or Erickson Engineer ERICKSON TOOLS DIVISION

2301-E Hamilton Ave., Cleveland 14, Ohio

"The Management Guide." Pointing up the ever-increasing emphasis being given by American business to management organization, the Standard Oil Company of California, 225 Bush St., San Francisco, Calif., announces the publication of "The Management Guide," a 100-page chartillustrated book describing the use of management guides as aids in performing corporate functions. Prepared by Standard's widely-known Department on Organization, the book is based on experience gained by the company in the last dozen years in preparing management guides for the use of its various

departments and subsidiaries.

Among the topics covered are the need and use of job description forms, the delegation of responsibility and authority, pointers on how to prepare management guides, and their proper use. For purposes of illustration, a hypothetical corporation has been described: Sample management guides for key positions from the president down are presented as examples of the method used by Standard in explaining the responsibilities and authority of management positions.

Dedicated "to sou

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everywhere," the
book is being distributed free to colleges of business
administration as
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offering training in
business leadership.

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TAPS LAST LONGER

Natco "Holesteel" Model C Floor Type Units. Way type units for drilling, boring, tapping and facing operations involved in automatic processing are described and illustrated in a 20-page catalog now available from Department 25, The National Automatic Tool Co., Richmond. Ind. Six case histories and actual production figures are included, together with diagrams of single spindle, fixed center multi-spindle and adjustable multi - spindle heads. Single speeds and complete specifications of each available machine are also included. Copy of Bulletin 848 is available free to mechanical executives upon request.

"Material Handling News" Vol. 7, No. 1. Published by the Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich., this edition portrays in the language of the layman what a fork-lift truck is designed to do, the comparative turning radius of solid-tired and pneumatic-tired machines, the principles of counterweighting, how turning radius affects maneuverability, and other basic factors that every fork-lift truck user, and prospect, should know. Concise, but wholly constructive, recommendations are made concerning determination of which power type-gas or electric battery-powered-is better suited to any specific operation or installation. Copy free upon request.

"Hydraulic Seals," is the title of an eight-page illustrated reprint now being distributed by the Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18, Ill., which provides an analysis of the advantages and disadvantages of the various kinds of "sliding type" hydraulic seals now in use. The reprint discusses recently developed "leakproof" seals, explains the cause of "chatter" and covers the general operating characteristics of metallic and non-metallic piston and piston rod seals, including synthetic rubber, piston cup, piston ring, flange, contracting ring, "O" ring, chevron, static, and other types of seals. Recommendations regarding the proper application of these seals are included. Copy free upon request.





Ask for literature

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EVERY Thomas Press is rugged, simple and safe in design, no matter which model you use. Not only do they do their work and do it better but Thomas Presses are featured by extreme accessibility and minimum maintenance and wear.

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PITTSBURGH (23), PA.

Wales Type "BL" Hole Punching Units for punching mild steel up to ½ inch thick are fully illustrated and described in a functionally colored 32-page catalog published by the Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. Featured is a new punch retainer that is designed to hold the punch in a self-contained holder and, at the same time, facilitate removal of the punch by simply contracting the retainer spring. Copy of Catalog BL free to mechanical executives upon request.

ACCO Registered Sling Chains. The Division, American Chain American Chain & Cable Co., Inc., York, Pa., has announced a revised edition of its catalog on ACCO Registered Sling Chains. The four-color 32-page catalog presents information on advantages, specifications. and working load limits relative to steel, iron and alloy sling chains. All attachments and their possible uses are charted for easy reference. Each of the 32 pages of the catalog has a finger-tip index for quick reference, and a simplified index is also provided as a guide to the use of the catalog. Copy of Catalog DH-80 free "Themac" Portable Electric Precision Grinders, designed for general use in the shop, are fully illustrated and described in a catalog prepared by the McGonegal Manufacturing Co., East Rutherford, N. J. Included is complete information on the features, contruction, operation, application, and specifications of the various grinders, as well as data on surface grinder brackets, spindle assemblies, extension spindles, and special spindle assemblies.

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Copy of the catalog is available to mechanical executives addressing requests

on their company letterheads.

AMF Industrial "Lowerator," a materials handling system which is designed to automatically raise and lower materials to a convenient working level, is fully illustrated and described in a fourpage two-color folder released by the American Machine & Foundry Co., 485 Fifth Ave., New York 17, N. Y. In addition to showing the use of the system in performing a variety of operations, the folder lists eleven main features of the Lowerator and presents illustrations of the closed and open types. Copy of Folder DM-518 free upon request.

Boeckeler Toolmaker Microscope, a highly accurate instrument for use in mold shops, toolrooms, and so on, is illustrated and described in a four-page twocolor circular now available free from the Boeckeler Instrument Co., 31 E. Rillito St., Tucson, Arizona.

Elliott Flexible Shafting is the subject of a 16-page two-color catalog released by the Elliott Manufacturing Co., 350 State St., Binghamton, N. Y. Illustrated and described are flexible shafting for power drives and remote controls; flexible shaft machines and accessories; Monocoil casing for push-pull controls; and special flexible shaft machinery. Copy of Catalog No. 49 is free upon request.

Colmonoy Data File. A folder containing engineering data sheets on the hard facing of forming and drawing dies has been published by the Wall Colmonoy Corp., 19345 John R. St., Detroit 3, Mich. Complete procedures are outlined for hard facing different size dies using three available alloys. Steps in preparing and overlaying the dies are given. Copy of data file free upon request.



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53 PARK PLACE

330

Write for Complete Catalog

MONTGOMERY

Machine Tool Accessories

Nicholson Special Purpose Files. The Nicholson File Co., 48 Acorn St., Providence 1, R. I., is now distributing a pamphlet comprising ten technical bulletins on special file types. Included is practical information on when, how, and why to use these files for aluminum, babitt, brass, bronze, copper, magnesium, die castings, cast iron, malleable iron, mild steels, annealed tool steels, stainless steel, plastics, die making, lathe filing, and precision work. Copy is available free by requesting Form No. 137.

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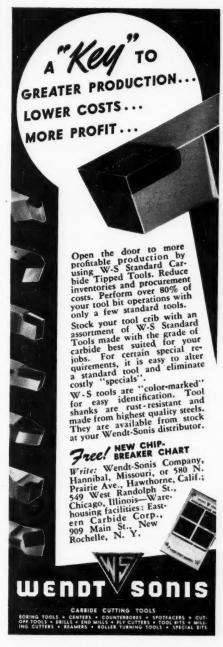
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Colonial Dual-Ram Surface Broaching Machine. A bulletin describing its complete line of improved dual-ram surface broaching machines is available from the Colonial Broach Co., Box 37, Harper Station, Detroit 13, Mich. Illustrations and text clearly show and explain important points of design and operation and provide a general outline of the uses and features of the new dual-ram machines. Also included in the bulletin are dimensional drawings and specifications, operating data, list of accessory equipment furnished and available with the various sizes, and so on. Copy of Bulletin No. RT-48 free upon request.

Attachments and Accessories for South Bend Lathes. More than 130 different attachmetns and accessories for South Bend lathes and drill presses are illustrated and priced in a 28-page 8½ x 11-inch catalog issued by the South Bend Lathe Works, 386 E. Madison St., South Bend 22, Ind. Many new items are cataloged, including some recently developed attachments not previously announced. Although the attachments and accessories covered are designed primarily for use on South Bend machine tools, many of them can be easily adapted to other makes of equipment. Copy of Catalog 77-U free upon request.

Hannifin "Directair" Electric Air Control Valve. The Hannifin Corp., 1101 S. Kilbourn Ave., Chicago 24, Ill., announces the publication of a four-page bulletin describing its "Directair" Electric Valve recently developed for the control of single or double-acting air cylinders, air-operated presses, and similar equipment. The bulletin describes the operating cycle of the valve and also contains detailed specifications and dimensional data. Copy of Bulletin No. 230 free upon request.



Universal Internal Chucker, designed primarily for the second operation chucking of parts where the bore and one face have been previously machined true with each other, is illustrated and described as to features, typical applications, specifications, and so on, in a four-page two-color circular issued by Speedgrip Chuck, Inc., 1102 W. Beardsley Ave., Elkhart, Ind. Copy free.

"Rockflux," a heavy duty concrete floor-patch which is claimed to be highly resistant to liquids, alkalis and acids, unaffected by oil and grease, and ready for any traffic the day after it is laid, is described in a four-page two-color folder now available free from the Flexrock Co., 3615 Filbert St., Philadelphia 4, Pa.

Whistler Heavy Duty Adjustable Perforating Dies for perforating materials up to and including 1/4-inch thick mild steel are featured in a 24-page two-color illustrated and descriptive catalog prepared by S. B. Whistler & Sons, Inc., 748 Military Rd., Buffalo 17, N. Y. Copy of Catalog No. 47B free upon request.

Dickerman 9-Inch Rol-Di-Feed, a compact self-contained cam driven feed which may be easily and quickly installed on the press bolster, and in some cases directly on the die shoe, to feed stock in any desired direction, is illustrated and described in a two-color circular now available free from the H. E. Dickerman Mfg. Co., 322-1213 Albany St., Springfield, Massachusetts.

"The Whistler Hydrodynamic Process for Embossing and Drawing Sheet Metal" is the subject of a 12-page profusely illustrated and descriptive bulletin issued by S. B. Whistler & Sons, Inc., 748 Military Rd., Buffalo 17, N. Y. Copy free upon request.

Sundstrand Contour Milling Machine, designed for the milling of irregular contours (both external and internal) on small parts from master cams, is illustrated and described as to construction features, operation, applications, capacity, and so on, in a six-page two-color bulletin prepared by the Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill. Copy free upon request.





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#### 9" CUTTING FLUTES-12" LONG DRILLS

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9/64"	12	9	1.50	11/32"	12	9	2.25
5/32"	12	9	1.50	23/64"	12	9	2.50
11/64"	12	9	1.50	3/3"	12	9	2.50
3/16"	12	9	1.50	25/64"	12	9	2.75
13/64"	12	9	1.60	13/32"	12	9	2.75
7/32"	12	9	1.60	27/64"	12	9	3.00
15/64"	12	9	1.75	7/16"	12	9	3.00
1/4"	12	9	1.75			-	
17/64"	12	9	1.85	29/64"	12	9	3.25
9/32"	12	9	1.85	15/32"	12	9	3.25
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19/32"	15	12	7.50	29/32"	15	12	12.50
%"	15	12	8.00	15/16"	15	12	13.00
21/32"	15	12	8.00	31/32"	15	12	14.00
11/16"	15	12	8.25	1"	20	15	16.00
23/32"	15	12	8.50	1-1/16"	20	15	17.00
3/4"	15	12	8.50	1-1/8"	20	15	18.00
25/32"	15	12	9.50	1-3/16"	20	15	20.00
13/16"	15	12	11.00	1-1/4"	20	15	22.00

#### VICTOR MACHINERY EXCHANGE, INC.

251 Centre St. Phone: CAnal 6-5575 New York 13, N. Y.

Wright "Speedway" Electric Hois The Wright Hoist Division, American Chain & Cable Co., York, Pa., has released a folder which describes the company's line of the "Speedway" Electric Hoists. This attractive red, gray and black, six-page folder introduces Speedway ½ to 10-ton electric hoists and includes such information as the 21 outstanding features of Wright Speedway Electric Hoists, action views, illustrations of each type of hoist, cross-sectional view of the hoist frame, and complete specifications. Copy of Folder DH-65 free upon request.

V-R "Bulldog" Toolholders, specifically designed for use with carbide and cast alloy inserts, are illustrated and described in a bulletin issued by The Vascoloy-Ramet Corp., 800 Market St., Waukegan, Ill. Covered are vertical ejectortype toolholders for holding various shapes of solid carbide and Tantung cast alloy inserts, as well as horizontal toolholders and inserts for turning, facing, boring, and cutting-off operations. In addition, the catalog shows a number of special toolholders for use on New Britain-Gridley, Cone, Davenport, and other machine tools. Copy of Catalog V-R 430 free upon request.

Walker Hydraulic Duplicators with one, two, or three dimensions are featured in a four-page bulletin issued by the Walker Hydraulic Duplicator Co., Box 72, Standish, Mich. The extent to which exact duplication can be accomplished by the use of Walker duplicating attachments installed on standard machining equipment, such as boring mills, milling machines, lathes, planers, and grinders, is illustrated and explained in the bulletin, copy of which is available free upon request.

Wright "Speedway" Electric Hoists. Bay State Oilstones. A catalog complete Wright Hoist Division, American & Cable Co., York, Pa., has reda a folder which describes the comsisting of the "Speedway" Electric boro, Mass. Copy free upon request.

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Rockford 36-Inch Openside Hy-Draulic Shaper. An eight-page two-color bulletin released by the Rockford Machine Tool Co., Rockford, Ill., illustrates and describes the Rockford 36-Inch Openside Hy-Draulic Shaper with hydraulically powered table drive and tool feed. Complete specifications of the machine are conveniently listed. Copy of Bulletin No. 300 free upon request.

Delapena External Hone, an Englishmade hand honing tool designed to produce precision external diameters within a matter of minutes, is illustrated and described in detail in a four-page two-color bulletin now being distributed by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio. Data on general purpose hone sets for ferrous and non-ferrous honing applications are included. Copy of Bulletin No. 300 free upon request.

Anton Parallels. Anton Machine Works, 52 Sands St., Brooklyn 1, N. Y., now has available a two-color leaflet illustrating and describing hardened parallels, including their use on a magnetic chuck in lining up small work against a back gage; indicating holes close to an edge on a die block; gaging slots; gripping shallow work close to the top of a vise; raising work off a table for drilling holes through the work, and so on. Tables listing stock sizes and prices of the parallels are included. Copy free upon request.



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Machine operators increase percentage of acceptable work

This indicating gage shows actual EXPANmeasurement of holes to fractions of SiON
.0001", yet is pactical for machine Pluoss
operators (as well as inspectors)
because of self-positioning for true
2-point gaging, and fool-proof ruggedness. Detects tapers and out-ofround, No wires, no air hose, Operators control machines better, produce higher average standard work. Request new Bulletin 40.

THE COMTOR CO. 44 RUNFORD AVE.

Reconditioning Carbide Cutting Tools. Rutland Tool Service, 13006 Greeley Ave., Detroit 3, Mich., now has available free literature regarding the reconditioning of carbide cutting tools.

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Air and Hydraulic Pressure and Flow Chart which provides considerable useful data that would otherwise require laborious calculations is now available at no obligation from The Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18, Ill. The chart contains easy-to-read, attractively laid-out data tables for fast, convenient

reference. One table lists push and pull stroke pressures in pounds for various cylinder sizes with various piston rod diameters at pressures from 50 to 3,000 p.s.i., as well as the oil consumption of hydraulic cylinders and air consumption of air cylinders from 11/2 to 20-inch bores. Another table presents pipe sizes necessary for well designed hydraulic circuits and indicates friction pressure loss for various pipe sizes and conditions of pipe, and losses in various fittings and valves.

The chart also provides recommended piston rod diameters for various loadings and mounting conditions, as well as recommend ed lengths of stop tubes placed inside The cylinders. chart is available in an attractive three-color 22 x 34inch wall type or an 8½ x 11-inch size in black and white, perforated for convenient ring-binder insertion.

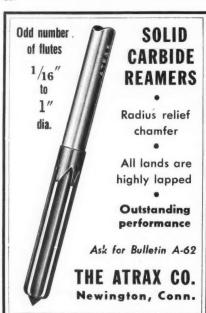
Gaertner Measuring Microscopes for laboratory and shop are illustrated and described in a 24-page bulletin published by the Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 41, Ill. Covered are micrometer microscopes, traveling microscopes, micrometer slide comparators, instruments for measuring creep, thermal expansion, and so on, and many different accessories and related equipment. An introductory section contains considerable information on the selection and use of measuring microscopes, their construction, optical principles, and method of calibration. Copy of Bulletin 161-48 free upon request.



AND FLEXIBLE SHAFT MACHINES

"The Key to Remote Control," a folder on Tru-Lay Push-Pull Controls, has been prepared by the Automotive & Aircraft Division, American Chain & Cable Co., Inc., General Motors Bidg., Detroit 2, Mich. In addition to a large double-page spread showing push-pull assemblies and complete dimensions, the folder also contains important tables and charts on the bending of conduit in relation to backlash, minimum recommended radius, maximum recommended input in pounds for amount of travel in inches, and friction loss. Copy free upon request.

"Just the Idea" is the title of an 18-page two-color catalog published by the Fab-Weld Corp., Dept. MMS, Pickwick and Richmond Sts., Philadelphia 34, Pa., which illustrates over one hundred pieces of different materials handling equipment, most of which are designed for use in conjunction with either electric or gasoline fork trucks, hand pallet trucks, overhead conveyors, or hoists. Covered skids, pallets, trucks, trailers, car bridge plates, hoppers and end dumps, as well as special equipment. Copy of the catalog is available free by requesting Form No. 36.



Matco Wheel Dresser, adaptable for surface and external grinders, is illustrated and described in a two-color circular now being distributed by the Matco Tool Co., 2830-36 W. Lake St., Chicago 12. Ill. Copy free upon request.

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Aeronautical Material Specifications AMS 7245 and AMS 7247 are now being offered in sheet form by the Heli-Coil Corp., 47-23 35th St., Long Island City 1. N. Y. Prepared and approved by the S.A.E., the sheets detail the chemical and physical specifications for Heli-Coil Screw Thread Inserts in corrosion-resistant steel and in bronze respectively. Copies free upon request.

Atlas 24-Inch Ball Bearing Jig Saw for cutting metal and various other materials is fully illustrated and described as to construction features in a four-page two-color bulletin published by the Atlas Press Co., 2346 N. Pitcher St., Kalamazoo 13D, Mich. Specifications of the unit are conveniently tabulated and various attachments available are pictured and described. In addition, the bulletin shows typical applications of the machine. Copy free upon request.

Stone Sawing Machines. The Stone Machinery Co., Inc., Syracuse, N. Y., now has available a leaflet illustrating and describing its Type SS-20 sawing machine with cross-feed, including its use in structural steel fabrication. Also available is a leaflet illustrating and describing the Stone "Blue Streak" Portable Electric Guided Saw for cutting a wide variety of materials wet or dry using diamond or abrasive wheels. Copy of either or both leaflets free upon request.

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GRINDING WHEELS & CUT-OFF WHEELS

14 x 7/64 x 3/4—36 grit 14 x 1/8 x 3/4—36 grit Only 60 cents each.

Thousands of sizes available. Send us your inquiries.

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Harrington "Bearcat" Electric Holst, product of The Harrington Co., 17th and Callowhill Sts., Philadelphia 30, Pa., is fully illustrated and described as to advantages, features, dimensions, and so on, in an eight-page two-color bulletin released by this firm. Copy of Bulletin P-53 is offered free to interested individuals upon request.

Allis-Chalmers Equipment for Machine Tools. Data concerning Allis-Chalmers motors, drives, controls, and coolant pumps supplied to the machine tool in-

dustry are contained in an eight-page bulletin released by the Allis-Chalmers Mfg. Co., S. 70th St., Milwaukee 1, Wis. Illustrations show the wide application of such equipment on machine tools of various types, including lathes, planers, grinders, presses, and chucking, milling and boring machines. Copy of Bulletin 25B7110 is available free to mechanical executives addressing requests on their company letterheads.

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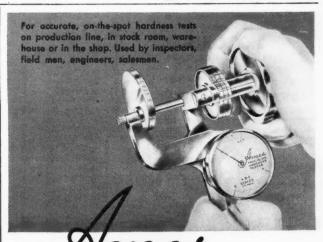
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Gisholt Plastic Soft Jaw Blanks for chucks are covered as to recommended uses, advantages, prices, and so on, in a twocolor illustrated bulletin released by the Gisholt Machine Co., Dept. A-M, Madison 10, Wis. Also discussed is the company's new department for reconditioning Gisholt chucks. Copy of the bulletin is available free to individuals requesting Form 1131 on their company letterheads.

Davis and Thompson Type VSI Vertical Indexing Machines are illustrated and described in a four-page bulletin released by the Davis and Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis. Copy of Bulletin 160 free upon request.

Electric Arc Induction Heaters and Control Instruments for preheating before welding and stress relieving after welding are illustrated and described in a two-color catalog sheet issued by Electric Arc., Inc., 152 Jelliff Ave., Newark 8, N. J. Copy free upon request.



# PORTABLE HARDNESS TESTERS

Amazing savings in time and expense can be realized by taking the Ames Hardness Tester to the work. For hardness testing flat or round stock, tubing, duplicate parts, knives, saws and irregular shaped pieces, reading directly in the Rockwell Scales. No cutting off specimens. No laboratory delays. Complete with wooden carrying case. Several sizes. Write for bulletin.

#### AMES PRECISION MACHINE WORKS

Makers of Precision Bench Lathes & Milling Machines
WALTHAM 54, MASSACHUSETTS

Lapointe DRV Double Ram Variable Speed Hydraulic Surface Broaching Machine with 3 to 32-ton capacity and 30 to 66-inch stroke and featuring a new low pressure hydraulic system is illustrated and described as to features and typical operations in a six-page two-color folder issued by The Lapointe Machine Tool Co., Dept. 140, Hudson, Mass. Included in the folder is a table of specifications, as well as dimensional drawings of the machine. Copy free upon request.

ADVANCE CLAMPS

Cut Set-Up Time 75%

**JIGBORERS** 

THE ONLY T-SLOT CLAMP
For use on all machines with T-slots.

Manufactured and sold by

ADVANCE MACHINE WORKS
FORT WAYNE 7, INDIANA

Bellows "Controlled-Air-Power" Devices. Published by The Bellows Co., Akron, Ohio, this 12-page two-color bulletin presents an illustrated explanation of "controlled-air-power," discusses how it replaces repetitive manual operations, lists a few of the typical operations being performed by controlled air-power, and illustrates and describes various controlled-air-power "packaged" devices, including feeds, vises, collet chucks, rotary feed tables, and presses. Copy of Bulletin CL-15 free upon request.

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Torit Dust Collector Catalog No. 34. Economical methods for collecting and cleaning dust-laden air from around industrial machines are outlined in a catalog issued by the Torit Manufacturing Co., 296 Walnut St., St. Paul 2, Minn. The catalog includes complete information on the Torit line of self-contained and cyclone type dust collectors and also describes recent improvements made in certain models and accessories. Copy of Catalog No. 34 free upon request.

SCHAFFER LOAD EYE BOLTS



#### CENTERING EYE BOLTS



SCHAFFER OLD EYE BOLT EYE BO

\* Carries ten times the load of ordinary Eye Bolt . . . Because it lifts in line with the load!

★ Prevents costly damage to machinery, etc., caused by standard eye bolts shearing off.

\* Built to last a lifetime.

\* Parts are easily replaceable.

\* Made of high grade steel . . . whose ductility and toughness is greater than ordinary Commercial Steel . . . therefore, SCHAFFER EYE BOLTS can be subjected to heavy intermittent strains and jerks.

\* Replaceable Bolts... for extra long life.

7/16" to 3/4" • 7/8" to 11/2"

\$11.75 each \$23.50 each

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#### Over the Editor's Desk

#### Wanted: Better Tooling

THE DAILY press and radio devote important amounts of space and time to news of the wars in foreign lands, but practically ignore the war that is going on in our own country—the war against inflation. Yet, inflation can destroy us—and is destroying us—just as surely as military capitulation to a foreign foe.

The American dollar will buy no more today than 55 cents would buy in 1939. It has lost 45 cents of its purchasing power in 10 years. This means that if a man had a \$1,000 life insurance policy fully paid up in 1939, and it became payable today, the money that his beneficiaries would receive would buy no more food, fuel or shelter, than \$550 would have purchased in 1939.

Lenin, the messiah of communism, said, "The best way to destroy the private property system is to debauch the currency—make money worthless." American communists, socialists, and misguided "liberals" are driving toward that goal. The government has famned the flames of inflation by pouring "printing press money" into the channels of trade. Labor has added fuel to the conflagration by demanding, and receiving, higher and ever higher prices for its contribution to the American economy, and in many cases is delivering less for the money received. As an example, brickmasons demand more dollars, today, for laying 500 bricks than they formerly charged for laying 1400 bricks. As a matter of fact, the high wage isn't nearly as destructive to the American economy as the failure to produce.

There seems to be no immediate prospect of correcting this situation, so far as government and labor are concerned, therefore any progress that is to be made in fighting this war will have to be made by the engineers upon whose shoulders fall the task of devising labor-saving machines and tools.

In the coal-mining industry important advances have been made in the development of machines designed for underground mining of bituminous coal. The machines cut and load in a continuous operation and eliminate the need for successive drillings and blastings. Fewer men are required in the mines, and both hazards and number of men exposed to hazards are reduced. The production by machine, in comparison with the old pick and shovel method, is greatly increased. But the development of these machines required the concentrated abilities of highly trained engineers.

Manufacturers must depend more and more on their tool and methods engineers for ways to cut costs and beat the inflationary trend. Now, when high prices are stifling the channels of trade, when competition is becoming ever keener, is a good

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time for these engineers to study each individual operation and production tool in the shop, to discover, wherever possible, ways to improve those methods, those operations and those tools.

Too often tool engineers are complacent about their tooling and methods. Manufacturers should send their methods engineers out to visit other plants occasionally and see what other methods engineers are doing. Every methods and tool engineer will benefit from careful study of the current production periodicals. These engineers should also keep themselves posted concerning new materials, both for production and tooling purposes.

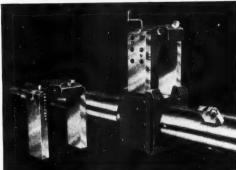
The tool engineer played an important part in winning the recent shooting war with foreign enemies; the manufacturer should make sure that he has an opportunity to use his abilities in the winning of the war against inflation.

Howard Campbug

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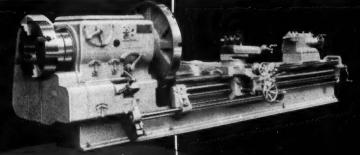
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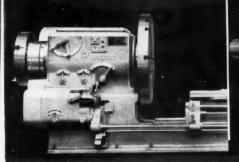
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